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ORIGINAL MEMOIRS.

RESECTION OF PORTION OF THE CHEST WALL AND OF THE DIAPHRAGM, FOR PRIMARY SARCOMA OF THE PLEURA.

(From the Surgical Department of the Prince Galitzin Hospital.)

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ON July 1, 1904, was admitted to the Surgical Department of the Prince Galitzin Hospital, a woman twenty years of age, having a tumor situated in the left wall of the thorax in the axillary line below the left nipple. She dated her illness from the previous April, when she first began to be troubled with violent shooting pain in her left side. Upon examination of the side upon the appearance of the pain she then first noticed under the skin a small tumor, of the size of a hazel-nut; this gradually increased in size thereafter until, at the time of her entrance into the hospital, its dimensions were 7 by 8 cm. Her general appearance was that of health.

When admitted, on the lower part of the left half of the thorax, posterior to the mammillary line, there was a soft tumor of spherical shape, fluctuating, without definite limit, its structure fading into the surrounding tissues. It seemed to be adherent to the eighth and ninth ribs. The skin over the tumor was normal and movable; no enlarged veins; no perceptible enlarged glands in the axilla; all internal organs normal; pulse ranging from 80 to 90.

On July 3, under chloroform narcosis, the growth was exposed. It presented the appearance of muscular tissue, in the centre of which was a cavity filled with blood. The capsule of the tumor was continuous with the muscles of the thoracic wall, part of which were removed with the growth. (Fig. 1.)

From the centre of the space left by the removal of the growth there was revealed an opening which led into the pleural cavity, on either side of which were the edges of the adjacent ribs, the eighth and ninth, which were eroded. The air was freely entering into the pleural cavity through this opening, which was now closed with a tampon of gauze.

The patient, in spite of the pneumothorax, breathed quietly, and her pulse was unaffected. It was now evident that the growth not only involved the parietal pleura, but also it was adherent to the diaphragm. After having opened widely the pleural cavity, it was possible to separate the tumor-mass from the diaphragm without cutting through the diaphragm. Neither infiltration nor nodular masses were visible on the dome of the diaphragm. A large gauze tampon was left in the pleural cavity, its end being brought out from the inferior angle of the wound. The greater part of the external wound was now sutured. The operation occupied about one hour. At its close the patient had developed marked shock, so that an infusion of saline solution was administered.

During the first hours after the operation the patient was groaning and turning about in her bed, but without dyspnœa. Gradually good reaction was established. The temperature gradually rose and in the evening of the third day reached its maximum, 38.4 C. (101.5 F.); respirations, 24; pulse, 120, of good quality. On the fifth day the intrapleural tampon was removed. No entrance of air into the pleural cavity followed this removal, and the wound was left without further tamponing. The healing of the wound progressed well thereafter, the patient having a normal temperature, good appetite and a sense of general well-being. On the eighth day primary union had taken place in the wound, and all sutures were removed. On the fourteenth day she was walking about the ward, the wound completely healed excepting at the point where the tampon had been inserted, where there was still a granulating surface. Auscultation revealed an

FIG. 1.—Primary sarcoma of pleura. Mass removed at first operation.

FIG. 2.—Part of wall of thorax and of diaphragm, removed at the second operation.

increasing expansion of the left lung. On the twentieth day she was discharged from the hospital in a good condition of health.

One month later, she noticed a thickening in the scar, but no pain, no cough; her general condition was apparently good. A gradual redevelopment of unmistakable sarcoma in the cicatrix followed but not until the lapse of four months did she return to the hospital.

In the meantime, the growth had extended greatly over the inferior portion of the left thorax, and by its involvement of the intercostal nerves was provoking great pain. Her general nutrition was still good. On the left wall of the thorax, in the region of the operation scar, sarcomatous nodes were visible, extending from the inferior axillary line downward to the space between the eighth and ninth ribs. The tumor had developed especially along the scar, where it had formed a thick mass with many protuberances, measuring fifteen centimetres in diameter. The skin was bluish, with many dilated veins, and closely adherent to the sarcomatous mass. There were no enlarged glands under the clavicle nor in the axilla or neck; no cough; respiration was deep and quiet. The respiratory murmur in the left lung was feebler than in the right, but could be heard all over the lung; the internal organs were all in good condition.

On November 2 the following operation was done: All the superficial nodes were first removed, when it became evident that they extended not only on the muscles of the thorax, but also on those of the abdomen as far as to the anterior superior spine of the ilium. Then the pleural cavity was again opened by the removal of all the inferior portion of the left thoracic wall from the seventh to the eleventh rib, together with a portion of the diaphragm which was covered with sarcomatous nodes. (Fig. 2.)

Upon opening the pleural cavity, the left lung immediately collapsed, and at the bottom of the cavity there could be seen the rhythmical contractions of the heart. Again the thoracic cavity was filled with a gauze tampon. Threatening heart failure at this moment developed, although the respiration was regular. An infusion of 500 cubic centimetres of saline solution, supplemented by hypodermic injections of camphorated oil and caffeine, overcame this tendency to collapse.

Before resecting the diaphragm it was carefully separated

from the peritoneum. At this moment the patient had a retching which caused the peritoneum to protrude into the pleural cavity like a bladder, while above it the heart was hanging temporarily deprived of its support. The projecting peritoneum was pushed back and held by the hand of an assistant until all the visible diaphragmatic disease had been removed. To the surface of the cut muscles from which the sarcomatous nodes had been removed, both of the thoracic wall and abdominal region, the Paquelin cautery was now applied, after which the cut edge of the diaphragm was sutured to the seventh rib, whereby the thoracic cavity was separated from the abdominal. Every bleeding vessel was carefully ligated; into the inferior angle of the wound a tampon was inserted; the external wound was closed by sutures. The operation occupied seventy-five minutes.

At its close, the patient was in marked shock, but breathed freely. Good reaction was gradually established; the respiration remained quiet, but the patient suffered much from vomiting, which continued for three days, exhausting her. Pulse, 105; respirations, 24; temperature, varying from 37.1 to 37.5 (99-100 F.).

On the fourth day after operation, temperature having risen to 38.3, the superficial dressing was changed; on the seventh day the tampons were removed. The patient had begun to complain of dyspnœa which was not relieved by the removal of the tampons. Temperature 39.2 in the evening, 38.8 in the morning; pulse 120. The eleventh day dyspnœa continued, and a redness along the suture line was noticeable. An exploratory puncture of the pleural cavity was made; neither air nor fluid was found within the cavity, but a stitch abscess along the suture line was opened. Most of the wound had healed primarily. The temperature fell thereafter, gradually, until at the end of one week it had become normal and dyspnœa had disappeared. The patient began to eat, and recovered noticeably her interest in her surroundings. The left lung expanded but the respiration within it was accompanied by some moist râles. The record of November 29 stated that the patient was feeling well, had no dyspnœa, was beginning to sit up in bed; the wound healed except at the site of the abscess.

On December 2, however, she began to complain of pain in

the scar, and two days thereafter a considerable node had developed in the middle of the scar, which two days later was removed and the surface underneath it seared by the actual cautery; some cough, with bloody sputum, followed the narcosis. Temperature rose again to 37.7 and 38.8, with crepitation in the lungs marking a patchy pneumonia. After ten days she again began to feel better and the temperature fell to normal.

December 19 a new sarcomatous node was appreciable near the lower angle of the scar, which was at once removed under local anæsthesia, and the base cauterized. Three days later, a third node appeared at the cut end of the ribs. All further interference was now abandoned.

At the first operation I had removed an encapsulated tumor, flat, ovoid, of soft consistence, and measuring ten centimetres in vertical diameter, nine centimetres transversely and three and one half centimetres anteroposteriorly. The capsule of this tumor was formed by the parietal pleura. The surface of the capsule turned to the lung did not present any deviation from normal in appearance, except thickening. At the point where the capsule of the tumor was adherent to the diaphragm, the remains of muscular fibres are clearly seen, arranged obliquely upon the tumor. On the surface of that portion which emerged between the ribs, the remains of the destroyed ribs and muscle are visible. The cyst-like cavity within the growth, at the time of the first operation, was filled with blood and sarcomatous detritus.

At this first operation we removed portions of several muscles, the serratus magnus and intercostal muscles, together with pieces of the eighth and ninth ribs. At the second operation was removed an enormous sarcomatous growth, with a portion of the scar left by the first operation, and much skin adherent to the growth. This mass weighed 220 grammes, was eighteen centimetres in length, nine in width and five in thickness. The mass consisted principally of exceedingly soft, friable, pigmented material. Microscopical examination showed the pigmentation to be the result of interstitial hemorrhages.

This growth was limited to the subcutaneous fat layer, and the muscular stratum, and did not extend through the pleura. The weight of the entire mass of tissue removed at this operation amounted to 620 grammes.

At this second operation, by an incision which began at the xyphoid process in front, the lower part of the left half of the thoracic wall, including the cartilaginous arch and parts of the eighth, ninth, tenth and eleventh ribs, were removed together with parts of the abdominal muscles which were infiltrated with sarcomatous nodes, and a portion of the musculature of the diaphragm. Microscopical examination showed the tumor to be composed exclusively of round sarcoma cells, with but little stroma; abundant blood-vessels and lymphatics.

Primary sarcoma of the pleura is rare. The principal interest, in my opinion, attaching to this case, is in the removal of so large a part of the wall of the thoracic cavity, and the extension of the operation to the diaphragm. Heretofore, even the wounding of the diaphragm has been considered as a serious occurrence; but, in the present case, it was detached from its normal point of insertion and was brought up to the lower half of the thorax, in spite of which there was not observed in this patient any derangement of respiration, either at the moment of the operation or during the first days following.

The dyspnœa which appeared on the fifth day after the second operation seemed to be due to the formation of an abscess and to inflammatory phenomena in the adjacent pleura. It is noteworthy, also, that in this patient there was an absence of any dangerous crisis from pneumothorax, a condition which every physician is apprehensive of if he has to invade the pleural cavity in an operation, in the absence of preëxisting pleural adhesions. It will be remembered that to obviate this danger, Sauerbruch, under Mikulicz's direction, devised for such operations a particular chamber by means of which there was secured negative pressure of air, amounting to between 12 and 16 mm. of mercury, thanks to which he had, in a

dog, at one séance, performed extensive resection of the thoracic wall on both sides; had incised the œsophagus, and opened the pericardial and mediastinal cavities. The dog bore the operation well, but died two days after. At the autopsy, Sauerbruch demonstrated that neither of the lungs was collapsed.

In another similarly conducted operation upon a dog, Sauerbruch removed two-thirds of one lung, and the dog breathed quietly throughout the operation.

I will not enumerate other proposals which have recently been made for preventing the dangers from pneumothorax. I content myself simply with communicating the experiences in the present case as to their bearing on the dangers of operative pneumothorax, as well as their bearing upon the possibilities of surgical interference with the diaphragm. As far as I am aware, from search through the literature, so considerable a resection of the diaphragm as was done in the second operation performed in this case had been done but once before. Gorohoff has reported in the "Transactions of the Society of Russian Physicians in Moscow," for 1901, the case of a child, aged five years, in which he operated for the removal of an enormous sarcoma of the abdominal wall and the left half of the thorax, with recovery.

In my own case the fatal end was not long delayed. The sarcoma rapidly extended in the site of the scar and in the skin adjacent thereto, pressing upon the left lung, with metastases in the left breast. Death by asthenia occurred January 16, following.

The autopsy demonstrated that, on the left side, the diaphragmatic curtain between the thorax and the abdomen had been entirely restored, the edge of the diaphragm having become adherent where sutured to the lower border of the seventh rib. The left lung was adherent to the parietal pleura, and was stuffed with sarcomatous nodes. The removed diaphragm showed that about two-thirds of the diaphragm had been taken away.

OBSERVATIONS ON THE DIAGNOSIS AND TREATMENT OF TYPHOID PERFORATION.[1]

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WHEN we consider the fact that perforation occurs in 2.5 to 3 per cent. of all cases of typhoid, and that fully one-third of the mortality of the disease is due to this cause, the importance of the surgical treatment of this complication, by which approximately 25 per cent. of cases are saved, is evident at once.

In accordance with the above it is estimated that something like 25,000 die annually from typhoid perforation, one-quarter of whom might be saved if promptly operated upon. Osler[1] says that during the first 10 years of the Johns Hopkins Hospital nearly one-third of the mortality of typhoid was due to perforation, and that since then this proportion has increased owing to the striking reduction of the death-rate of the toxæmic group.

As to the mortality of these cases subjected to surgical operation, Harte and Ashhurst,[2] in a paper read in 1903, collected 362 cases with a mortality of 74.03 per cent. Doubtless this is a little too low if all the cases operated upon could be included, for unsuccessful cases are often not reported except in connection with successful cases.

The result of surgical operation in typhoid perforation has doubtless improved in recent years. This improvement depends largely on two factors, an early diagnosis, with a correspondingly early operation, and improvements in the technique. In some of the cases operated upon I have been im-

[1] Read before the New York Surgical Society, February 28, 1906.

pressed with the advanced stage of the peritonitis in comparison with the supposed time since perforation. It is true that it is a well-established fact that peritonitis may occur without actual perforation. G. G. Davis [3] and E. G. Cutler and J. W. Elliot [4] have reported operations for peritonitis during typhoid where no perforation and no other cause of the peritonitis was found save in the latter case a deep ulceration about ready to perforate. It is quite likely that the peritonitis in not a few cases operated on after perforation may have commenced before the actual perforation.

All are agreed that an operation as soon as possible after perforation, which depends upon an early diagnosis, is most essential to the best results. The fact that the results in cases operated upon long after perforation has occurred have been surprisingly good is not incompatible with the importance of early operation. In the statistical tables of Harte and Ashhurst [2] 55 cases were operated on over 36 hours after perforation with a mortality of 67.2 per cent., a lower mortality than in those operated on at any earlier period. This is readily explained by the fact that patients surviving the perforation so long have a milder infection or the process has been slow enough to permit a combative reaction or a limitation of the process. My own experience is limited to 6 cases operated on in the Presbyterian Hospital and 1 case in private practice. In addition I have collected the remaining cases, 11 in number, operated on in the Presbyterian Hospital in the last 10 years, comprising all the cases operated on for typhoid perforation according to the records, in order to study the symptoms which have led to the diagnosis of perforation.

Although medical men are more alert than ever to make the diagnosis of perforation, the difficulties have not materially diminished except in so far as they are more ready to advise exploratory operation when perforation is suspected. As Osler [1] has said, what we need is a fuller knowledge of the symptoms of perforation apart from those of the consecutive peritonitis, which is what is usually diagnosed.

It is at the end of the second week and in the third week that we are to be on the look out, and from then on, even throughout convalescence. The average period of the disease at which perforation occurred in my group of 17 hospital cases was the twenty-seventh day of the disease.

We are to bear in mind the greater probability of perforation in severe cases and in those with distention or hæmorrhage, and that it is not uncommon in walking typhoid. In 4 of the 17 cases in the table there had been previous hæmorrhage; in at least 1 case distention had been a marked feature; but in the majority of cases the previous course had been that of a typical typhoid and not unusually severe.

Having, then, a certain period and certain types of cases in which we are to be especially on the outlook for signs of perforation, what are these signs or symptoms? I have divided the symptoms present in each case into two groups, the initial symptoms and those subsequently developed, the latter depending on the consecutive peritonitis.

There is only one symptom that has been nearly uniformly present in all the cases on the list, and that is abdominal pain, usually coming on suddenly and generally severe. It was present in 15 out of 17 cases, and slight pain was present in another case. It is usually complained of in the lower half of the abdomen and most often on the right side. In the one remaining case it is distinctly stated that there was no pain, and here an apparently walled-off cavity containing fæcal matter and lymph was found on operation. In the case in which the pain was slight there was no perforation in the ileum but sloughing areas in the sigmoid, with perforation.

Tenderness was the next most common symptom, being noted in 7 cases in the early stages and in 5 others subsequently. Rigidity was only mentioned in 4 cases at the outset but developed in 9 others before operation. Perhaps the percentage of cases showing tenderness and rigidity as initial symptoms is lower than in the experience of most others, but these are symptoms of peritonitis, and the most reliable ones, rather than of the perforation itself.

The complaint of sudden severe abdominal pain is noted by writers on the subject as a "reliable and constant symptom" (F. T. Stewart[5]), "the note of alarm," (Armstrong[6]), "the most valuable sign," (McCrae & Mitchell[7]), and one that should "always lead to the suspicion of perforation and beginning peritoneal infection" (Shattuck, Warren and Fraser[8]).

To be sure, as pointed out by Stewart,[5] pain is a frequent symptom in uncomplicated cases of typhoid, tenderness is common over the ileum and slight rigidity may be present. But the sudden onset of severe pain in the right lower quadrant or the lower half of the abdomen in a case of typhoid should create a very strong suspicion of perforation. If in a short time tenderness and rigidity are associated with it we should not wait for further indications but advise operation at once. If we have any symptom of the perforation itself it is the severe pain of sudden onset, and if this merely indicates commencing peritonitis it is the best early symptom that we have.

I agree with Harte[2] that rigidity is a most valuable sign; but that "it is never wanting except in patients with unusually large and pendulous abdomens" I can not agree. In at least two cases on the list its absence was noted and in one case (No. 14), in spite of the absence of liver dulness, its absence at my first examination led me to delay operation and thus miss the most favorable time to operate. Since that experience I would not wait for the presence of rigidity before making the diagnosis of perforation or advising operation. Rigidity and tenderness are our most valuable signs of peritonitis and are not always present until this is well established. In typhoid the sensorium seems to be so blunted that they are not present as certainly or as early as in cases of appendicitis.

Vomiting was present in 4 cases as one of the initial symptoms, often in consequence of the severe abdominal pain, but in one case without any pain or other symptom but weakness (Case IX). Vomiting was present in 7 other cases among stage but was slight in one case and had been constantly present in the other.

An initial fall of temperature was not noted in any case. As Osler [1] says, "The time-honored picture of perforation must be erased." It was present as a late symptom in 2 cases, indicating collapse due to peritonitic absorption. Murphy [9] rightly lays great stress on the point that there is little depression immediately after the perforation of the intestine and no collapse, and that the latter is a late symptom and the expression of absorption of infective material. It is an unfavorable symptom. Early collapse is more a symptom of hæmorrhage than of perforation, both of which may occur together.

Among the late symptoms more or less distention or tympanites was noted in 13 cases, dulness in the flanks in 4, diminution or absence of abdominal breathing in 5, and of the liver dulness in 5. The loss or lessening of liver dulness with a flat belly may be pathognomonic of intestinal perforation, but it is a late and variable symptom as a rule. The leucocyte count was not of much assistance. It was high (over 12,000) in 3 cases and somewhat high for typhoid in 4 (7700, 7900, 8000, 9200), but in one of the latter it had been 12,000 six days before. In others it remained low.

Rise of temperature, pulse and respiration was the rule; in some cases the temperature became high.

The late symptoms confirm the diagnosis but we should endeavor to operate before these symptoms develop.

We need nothing more than the characteristic pain, tenderness in a fixed spot, and rigidity, to indicate an immediate operation, and we need not require both the tenderness and rigidity to be present before proceeding to an exploratory operation. The latter is quite safe, far safer than a fatal delay, and one may perhaps anticipate perforation and, by infolding the intestine over the sloughy base of an ulcer, prevent it. In one case during the past summer, having recently had the experience above referred to, when, owing to the absence of rigidity and marked tenderness, I delayed operation when perforation existed, I did an exploratory operation when

there was merely a strong suspicion of perforation on the part of the medical staff. The patient at the end of the second week of the disease complained of sudden severe abdominal pain and considerable tenderness in the right lower quadrant, and there was diminished abdominal respiration. No rigidity or other symptoms were present. On operation no perforation and no peritonitis was found. As a result of an appendicectomy and salpingectomy done four years before there were several bands of adhesions, binding the ileum into the pelvis, which were freed. One of these was adherent to the ileum at the situation of an ulcerated Peyer's patch and, together with the neighboring intestine, was quite congested. After operation the patient was free from the pain and tenderness and made an uninterrupted convalescence. In another such case operated on by Dr. F. Tilden Brown last summer no perforation was found and the temperature fell to normal the next day and continued so. I have explored through an incision under cocaine anæsthesia and found no free gas, fluid or other signs of peritonitis and hence excluded perforation. In such cases one can exhaust a sterilized catheter passed to the bottom of the pelvis to determine the absence or character of free fluid.

In connection with the operation itself there are several points as to which opinion and practice among different surgeons vary to some extent. Firstly, as to anæsthesia. I much prefer general anæsthesia. These cases take gas and ether well, and the latter is a heart stimulant. In my first two cases at the Presbyterian Hospital I used cocaine anæsthesia. The incision is painless and the procedure is satisfactory for the purpose of exploration to determine whether free fluid or other signs of perforation or peritonitis are present. But retraction of the edges and the necessary handling of the inflamed intestines are painful and this together with the realization of being subjected to operation, in spite of a blunted sensibility, causes more shock than the same operation under general anæsthesia. Most surgeons now prefer general anæsthesia but others, such as Cushing,[10] and Hays [11] operate mostly under cocaine anæs-

thesia. If cocaine is used a few whiffs of chloroform may be advantageously given when the peritoneal cavity is opened.

As the lower three feet of the ileum is by far the most frequent site for the perforation,—in 95.5 per cent. according to Haggard,[12] while according to Harte [2] 73 per cent. were in the lower twelve inches,—the incision should be placed so as to readily expose this part. I prefer the incision through the right rectus, as the lower end of this allows better drainage of the pelvis than the right oblique incision which is preferred by some. Owing to the fact that in cases at the time of operation there is as a rule more or less free fluid, often of a foul odor, and some intestinal contents extravasated, the best method of getting rid of this is important. My personal preference is for irrigation with a large amount of hot normal saline solution through a large Chamberlain tube. In these cases there are seldom many if any adhesions and all parts of the peritoneal cavity may be irrigated and cleansed with the least possible traumatism. Furthermore the hot saline is an effective stimulant. In the table of hospital cases irrigation was used in 14, not mentioned in 2 and not used in 1. In the last named only the area about the perforation was cleansed with the salt solution, and though operated on about 2 hours after the perforation, in relatively good condition, the patient died with symptoms of peritonitis less than 36 hours after operation. Whether the occurrence of peritonitis would have been avoided by irrigation no one can say. Some surgeons do not irrigate. Thus of 7 cases reported by McCrae and Mitchell,[7] as operated on at the Johns Hopkins Hospital, irrigation was employed in only one case.

Anderson,[13] believing that the cause of death after operation for typhoid perforation is toxæmia from the contents of the paralyzed bowel, recommends that the ileum be emptied of its contents and the bowel itself irrigated through the perforation and through special incisions. He has used this method in 9 cases with satisfactory results. The chief objection to this procedure lies in the time required, as it is generally agreed that a short operation and an early operation are two of the essential requirements for success.

Drainage is almost always used. In one successful case of Dr. F. T. Brown's (see table) drainage was omitted but there was little or no free fluid. The method of drainage varies greatly. After irrigation I use a large rubber tube split down the side, with a core of gauze, or else a large cigarette drain introduced well down into the pelvis. According to the experiments of F. T. Murphy,[14] the latter is walled off earlier; the tube, therefore, drains the general peritoneal cavity for a longer time. Then with the head of the bed raised very high, in the high Fowler position, gravity assists all free fluid into the pelvis from which it is drained away.

In the table of 17 hospital cases 4 recovered, a mortality of 76.4 per cent. Of my own 6 hospital cases 2 recovered, a mortality of 66.6 per cent., or, including one previous case operated on in private for septic peritonitis of origin unknown to the two eminent consultants who saw the case three hours previously, a mortality of 71.4 per cent.

Of the cases which died, my first case died on the table while infusion was being given. Operation had been made possible only by a clysis given just before. Fifty-two hours was the longest that any fatal case survived the operation.

The time between perforation and operation varied from 2 to 30 hours, and averaged 10.3 hours in the 15 in which it is mentioned. The day of the disease on which perforation occurred varied from the tenth to the sixty-sixth and averaged the twenty-seventh day. Three were in the second week, 5 in the third, 1 in the fourth and 7 at a later period. Of those that recovered one was shown to the N. Y. Surgical Society by me in December, 1905. My other successful case subsequently developed Pott's disease of the spine. As to his convalescence, his temperature first reached normal 19 days after operation and a week later he had what appeared to be a relapse for 12 or 13 days. Sixteen days after operation he developed a fæcal fistula through the sinus left by the drains. This fistula closed in 3 weeks. Whether this came from the sutured perforation

or a second perforation, cannot be definitely stated. Cases where a second perforation has occurred subsequently have been nearly uniformly fatal.

In connection with the cases that recovered it may be of interest to call attention to the fact that the ages were 9, 13, 17, and 23. The percentage of recovery in cases of children from 6 to 15 years is about twice that of adults. These cases developed in the tenth, forty-fourth, sixty-sixth and twenty-ninth day of the disease respectively. The cases developing on the forty-fourth and sixty-sixth day of the disease were in a relapse, and such cases as well as those occurring in convalescence give a more favorable prognosis.

The last case I operated on deserves especial mention on account of the unusual site of the perforation, *i.e.*, in the sigmoid colon. This patient, M. B., 20 years old, had run a fairly typical typhoid course with considerable abdominal distention throughout when, on the morning of the twenty-fifth day, the day of the perforation, she passed a few small blood-clots through the rectal tube. The pain at the time of perforation was not very acute and was referred, with the tenderness, to the left lower quadrant. There was no rigidity. The incision was made in the median line on account of the symptoms and no perforation was found in the ileum after careful search. On examinating the large intestine a good sized irregular necrotic area was found in the sigmoid with a perforation on either side. This was inverted with two rows of Lembert sutures with some difficulty, owing to the friable condition of the surrounding parts. She died 18 hours after operation. On post-mortem the sigmoid for 6 or 8 inches in the vicinity of the perforation presented a worm-eaten appearance of the mucosa, the edges of the ulcerations not being undermined. At two other points perforation appeared imminent. The perforated area was gangrenous.

In the tables of Hare and Ashhurst among 190 cases the large intestine was involved only 7 times, and among these 7 the sigmoid only once. The prognosis is worse in cases of perforation of the large intestine and they have been overlooked and only found on autopsy.

In conclusion, without summarizing all the facts of importance, I would emphasize (1) the value of severe pain of sudden onset in the lower half of the abdomen as an early sign of perforation and its increased value as an indication for operation when associated with localized tenderness and rigidity; (2) the importance of exploratory operations in case of doubt in view of the good results which follow if no perforation is found and of the earlier period at which the operation is done if perforation is present.

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TABLE OF CASES OPERATED ON AT THE PRESBYTERIAN HOSPITAL.

No.	Name and Age.	Date.	Operator.	Day of Disease	Previous Course of Disease.	First Symptoms of Perforation.	Subsequent Symptoms of Perforation.	Time of Oper'n after Perf'n.	Operation.	Irrigation.	Drainage.	Result.
1	M.D. 25	Sep. 8, 1900	Woolsey.	42 In Relapse. (?)	28th day. Temperature normal, then rose, continued high. Widal pos. 22d day. Diarrhœa.	Abd'minal pain and tenderness. Mass size of finger in right iliac fossa. Rigidity not mentioned.	Vomiting. Free perspiration. Hiccough. Pulse imperceptible. Clysis given before operation.	13 hrs.	Cocaine. Med. incis. Turbid serum. Perf. ¾″ in diam., 5″ from cæcum; 2 rows Lembert sutures. Retraction of wound and handling gut painful.	Yes	Cigarette.	Died while infusion being given on table
2	C.H. 24	Oct. 11, 1900	Hawkes.	10	Ordinary typhoid.	Severe abdominal pain.	After some hours increasing distention, tenderness and rigidity. Hiccough, vomiting. Temp. 103° to 99°. L. C. 7,000 to 12,000 to 15,200.	30 hrs.	Through R. rectus. Yellow fluid, fæcal odor. Perf. 12″ from cæcum. Tissue ¼″ around excised; 2 layers Lembert sutures.	Yes	Rubber tube. Four strips of gauze.	Died in 5-6 hrs.
3	V.S. 18	Feb. 17, 1901	McCosh.	31	Ordinary; 2 hæmorrhages 20 and 2 days before.	Sudden abdominal pain. Vomiting in 2 hours.	Increasing rigidity, distention and tympany. Slight shifting dulness in flanks. Liver dulness lost. Double friction rub Rt. Cost. margin.	9¾ hrs.	Cocaine. R. intermuscular incision. A little chloroform. Foul green fluid. Perf. ⅛″ diam., 8″ from cæcum. Three tiers Lembert sutures.	Yes	Glass. Several strips of gauze	Died in 32 hrs.
4	E.J.F. 24	July 26, 1901	Woolsey.	15	Entered hosp. as appendicitis 15 days ago. Widal pos. Hæm. yesterday.	Severe constant abdominal pain and tenderness.	Vomiting. Distention. Abdomen soft. L. C. 8,000 (12,000 6 days ago).	14 hrs.	Cocaine. Med. incis. Large amount purulent serum. Perf. 2″ from cæcum. Lembert sutures.	Yes	3 Cigarette.	Died in 8¼ hrs.
5	A.S. 21	Aug. 3, 1902	Brown.	36	Ordinary course. Widal positive.	Severe pain in cæcal region, disappeared with ice bag, returned more severe.	Tenderness, rigidity, retraction and then slight distention. Vomiting. Temperature.	20 hrs.	Chlorof. Med. incis. Foul yellow fluid; 3 perforations in ileum sutured.	Yes	Vaginal.	Died in 28 hrs.
6	K.M. 23	Sep. 6, 1902	Brown.	29	Ordinary. Widal positive 14th day. Numerous hæmorrhages	Very severe pain in Rt. lower quadrant. No rigidity or tympany.	Dullness over lower abdomen. Temp. and pulse rose. Rigidity and tympany began to appear. L. C. 3,600.	7 hrs.	Gas and ether. Intermuscular incision. Adherent omentum nearly closed minute perforation.	?	No drainage.	Recovery.

7	M.B. 23	July 26, 1902	Brown.	40	Ordinary typhoid.	Sudden pain, tenderness and rigidity in Rt. iliac fossa.	Liver dulness 1″ high. No abdominal respiration. Rigidity and tenderness increased. L. C. 6,200.	4½ hrs.	Chlorof. Rt. rectus incision. Free fluid, no gas. Perf. ¾″ in diameter sutured.	Yes	Cigarette.	Died in 14 hrs.
8	H.M. 9	Sep. 23, 1903	Woolsey.	10	In bed only 1 week. Had solid food. Brought to hospital with peritonitis. Diag., appendicitis.	Abdominal pain and tenderness.	Some rigidity, tenderness and tympanites. Diminished peristalsis and abdominal respiration.	?	Gas and ether. Rt. intermuscular incision. Appendix normal removed. Purulent serum. Perf. in lower 18″ in ileum. Purse string and row of Lembert sutures. Thinned patch inverted.	Yes	Large cigarette to pelvis and R. iliac fossa.	Recovery. On 16th day fæcal fistula. Relapse. Later Pott's disease of spine.
9	B.B.	Oct. 21, 1903	McCosh.	About 21	Typical.	Vomiting, inability to hold anything on the stomach. Weakness. No pain.	Distention, slight rigidity in Rt. lower quadrant.	?	Chlorof. Incision through R. rectus. Perf. in lower ileum. Silk Lembert sutures. Apparently walled off cavity containing fæcal matter, lymph, etc.	?	Cigarette.	Died in 25 hrs
10	E.M. 54	Nov. 6, 1903	McWilliams.	Sick some days.	Brought to hospital with symptoms of peritonitis.	Intense abdominal pain.	No abdominal respiration. Distention. Movable dulness in flanks. General tenderness.	?	Gas and ether. Med. incision. Foul serum. Perf. 16″ fr. cæcum. Purse string suture.	Yes	2 Cigarette.	Died in 25 hrs.
11	W.J.K. 21	Sep. 22, 1904	Hawkes.	15	Ordinary typhoid.	Severe abdominal pain. Rigidity in lower abdomen.	Temperature rose to 106°. Vomiting. Typical signs of peritonitis.	6 hrs.	Gas and ether. Med. incision. Free gas and serum. Perf. 18″ from cæcum. Two layers of Lembert sutures.	Yes	3 Cigarette.	Died in 6 hrs.
12	M.M. 19	Sep. 30, 1904	Hawkes.	20	Considerable abdominal pain.	Sudden severe pain in Rt. iliac fossa, with tenderness and rigidity.	Vomiting. Hiccough. Liver dulness diminished. L. C. 7,900.	4 hrs.	Gas and ether. Med. incision. A little gas and foul fluid. Perf. ⅜″ diam., 12″ from cæcum. Two layers of Lembert sutures.	Yes	2 Cigarette.	Died in 52 hrs.
13	W.C. 17	July 28, 1905	Woolsey.	66 34th day of relapse	Original fever 8 days. Normal 19 days. Relapse severe. Widal pos. 2d week of relapse.	Sudden pain in in Rt. lower quadrant. Marked tenderness below umbilicus.	Temp. 105°(from 101°). L. C. 7,700. Rigidity below umbilicus. Tympanites. Slight shifting dulness. Abdominal respiration absent in lower half.	6 hrs.	Gas and ether. R. rectus incision. Foul greenish fluid. Perf. ¼″ diam., 15″ from cæcum. Two rows of Lembert sutures. Omentum adherent to gut at ulcerated patch above.	Yes	Large rubber tube with gauze core to pelvis. High Fowler position.	Recovery. Relapse very long, followed by another relapse.

TABLE OF CASES OPERATED ON AT THE PRESBYTERIAN HOSPITAL—*Continued.*

No.	Name and Age.	Date.	Operator.	Day of Disease	Previous Course of Disease.	First Symptoms of Perforation.	Subsequent Symptoms of Perforation.	Time of Oper'n after Perf'n.	Operation.	Irrigation.	Drainage.	Result.
14	E.S. 25	Aug. 19, 1905	Woolsey.	14	4 weeks ago heat prostration Widal negative. L. C. 16th. 13,600; 19th, 17,300.	Sudden abdominal pain, disappeared and then returned. Abdomen a little distended but soft.	First seen by me after enema, when symptoms temporarily relieved. Later slight rigidity and distention. Temperature fell to 99°. Liver dulness absent.	24 hrs.	Gas and ether. R. rectus incision. Gas and free fluid. Perf. ¼" in diameter in lower 18" of ileum. Purse string and row of Lembert sutures.	Yes	Large cigarette drain.	Died in 14 hrs.
15	M.B. 20	Sep. 15, 19c	Woolsey.	25	Typical. Widal positive. Distended all along. L. C. 6700. Blood through rectal tube, Sep. 15, a. m.	Some pain in left lower quadrant. Distention and rise of temperature.	Vomiting. Temp. 105°, pulse 140. Distention. Tenderness below and to left of umbilicus. Pain not severe. No rigidity. Liver dulness normal.	4½ hrs.	Ether. Med. incision. Gas and some free fluid. No. perf. in ileum. In sigmoid good sized irregular area necrotic. Perf. on either side inverted with two rows Lembert sutures; very friable.	Yes	Rubber tube, gauze core, and large cigarette drain.	Died in 18 hrs.
16	G.H. 21	Dec. 19, 1905	Eliot.	18	Typical.	Sudden severe pain and chill, nausea and vomiting.	Temp. rose 102° to 103°. L. C. 11,400 to 12,300. Abdomen tender, rigid. slight distention. Liver dulness diminished.	2 hrs.	Gas and ether. R. rectus Incision. Free gas and 8 oz. free fluid. Perf. 8" from cæcum. Purse string and one row Lembert sutures.	No, only local cleansing.	Large cigarette.	Died.
17	E.G.	Jan. 14, 1906	Hawkes.	44 In Relapse.	Typical. Widal positive. L. C. 8,700. Distended for 3 days.	Sudden severe pain in R. L. Q., with some local tenderness and rigidity.	4 hrs. later distention. Rigidity and tenderness especially in R. iliac region. Some dulness in both flanks. Abdominal resp. diminished. L. C. 9,200. Temp. rose to 104°.	5 hrs.	Ether. R. Intermusc. incision. Free fluid, no odor. Pinhole perf. 8" from cæcum. Purse string and Lembert sutures.	Yes	Cigarette drain.	Recovery.

COMBINED OPERATION FOR THE REMOVAL OF THE APPENDIX AND THE CURE OF RIGHT INGUINAL HERNIA.[1]

BY FRANZ TOREK, M.D.,

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HAVING had a number of patients upon whom I had to operate both for chronic appendicitis and right inguinal hernia, the two operations being performed at different times, it occurred to me that it would be in the patient's interest to combine the two operations in one if possible. On one occasion, where I had a large hernial opening, I attempted to bring down the appendix into the hernial opening, a procedure which suggested itself through the fact that the appendix is occasionally found in a hernial sac. The attempt, however, proved to be an absolute failure. Thereupon I devised the operation following. It consists simply in extending the skin incision somewhat higher up than usual for hernia operations, in dividing the fascia of the external oblique about at the usual place for the gridiron operation for appendicitis, but extending it downward into the external inguinal ring, and then completing the operations for hernia and for appendicitis in the usual way.

To describe the operation more in detail, it is performed as follows: An imaginary line is drawn from the anterior superior spine of the ilium to the umbilicus. A point on this line at a distance equal to one quarter of its length from the iliac spine marks the beginning of the incision, which is carried down from here to the external inguinal ring. The aponeurosis of the

[1] Read before the Surgical Section of the New York Academy of Medicine, March 2, 1906.

external oblique is exposed throughout the length of the incision. This fascia is now incised in the direction of its fibres, as is customary in the gridiron operation for appendicitis, exposing the internal oblique muscle; but the incision is prolonged downward so as to terminate at the apex of the external inguinal ring. The aponeurosis of the external oblique is prepared off from the underlying parts in the usual manner, on the outer side exposing Poupart's ligament. Then the hernia operation is proceeded with up to the point where the sac is cut off. Here the hernia operation is intermitted and attention turned to the appendix. The fibres of the internal oblique and transversalis are separated bluntly in the usual manner, the peritoneum is opened, the appendix removed; then the peritoneum, transversalis fascia, and muscles are closed again; in a word, the appendicitis operation is completed, except that the aponeurosis of the external oblique is still left open.

We now return again to the hernia operation and suture the internal oblique and transversalis to Poupart's ligament according to any of the approved methods, and finally suture the aponeurosis of the external oblique in the entire extent of its incision, so as to close both the appendicitis and the hernia operation. Lastly, the skin is sutured.

One might ask why, after incising the aponeurosis of the external oblique, one should not first perform the appendicectomy and then do the hernia operation ? This seems to me to be less advisable, because in operating on the hernia a considerable amount of traction is apt to be made on the sac, and this traction may invalidate the suture by which the peritoneum was closed over the appendicitis operation, whereas, on the other hand, if the sac is closed first and the appendicitis operation performed next, there is so little traction on the peritoneum during the latter operation that it will not interfere with the soundness of the closure of the neck of the sac.

Again, it might appear strange to some why, after closing the sac, we should turn our attention to the appendix, instead

of at once putting in the sutures to unite the internal oblique and transversalis muscles to Poupart's ligament. The answer is, that this latter suture is a very delicate one, owing to the fact that the sutures embrace muscular tissue and that, during the efforts at bringing the appendix to the surface, the abdominal muscles may be subjected to rather extensive manipulation during which the muscle fibres could easily be injured where they had been sutured to Poupart's ligament.

The combined operation has decided advantages over the performance of the two operations at separate sittings. It saves the patient one operation and it takes only very little longer than the hernia operation alone would require, for, after the aponeurosis of the external oblique has been laid open so widely, the appendicitis operation is performed more easily, and therefore more rapidly, than where the usual short incision through the aponeurosis is made. Furthermore the combined operation will have a claim to greater firmness of the abdominal wall, as it is certainly better to have one incision in the aponeurosis than two. It goes without saying, that in those exceptional cases where the diseased appendix is situated within the hernial sac, the method described above is not needed.

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APPENDICULAR FEMORAL HERNIA, WITH NOTES OF ONE HUNDRED CASES.[1]

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OF PHILADELPHIA.

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In the summer of 1900 the writer operated upon a woman, about 70 years of age, for a painful, fluctuating swelling in the right groin which was supposed to be a suppurating inguinal adenitis. (See Case 99.)

The incision revealed a cavity, containing a small, offensive, gangrenous mass, which proved to be the vermiform appendix. The cavity was found to be the sac of a femoral hernia. The distal half of the appendix was gangrenous; the proximal portion was nearly normal. This was a case of gangrenous appendicitis occurring in the sac of a femoral hernia. Although this case excited a deep interest, no investigation of the subject was undertaken at the time.

In August, 1904, I saw, in consultation, a woman who had a lump in the right groin, which had been present for three weeks. The diagnosis of femoral hernia had been made by her physicians, an opinion in which I fully concurred. (See Case 100.)

At the operation, the swelling was found to consist chiefly of serum, but the sac also contained the entire appendix vermiformis, the base of which was so tightly grasped at the neck of the sac that reduction was impossible until the constriction had been divided.

Although this is a rare condition, I have been able to collect 100 cases, including these two personal experiences, in which the appendix alone occupied the sac of a femoral hernia.

[1] Read before the Philadelphia Academy of Surgery, April, 1905.

All those in which any other portion of the intestine was reported as being present, have been excluded. While an effort was made to include every case, some, undoubtedly, have been overlooked.

It would be a difficult task to determine who first noted the presence of the vermiform process in the sac of an external hernia. Such observations, however, are not confined to recent times, having been recorded by Garengeot (Traité des operations de Chir., 1731, i, 237), and by Sandifort towards the end of the eighteenth century. Tritschler wrote on hernia of the cæcum and appendix in 1806. Rust described (Handbuch der Chir., 1832) hernia appendicularis. Among other contributors to this subject are Klein (1886); Brieger (1893); Bajardi (1895); Spurrier and Corner (1902); Vesignie (1903), and Wassiljew (1904).

In addition to the papers devoted to a more or less formal discussion of the subject, there are a large number of individual cases recorded. This is especially true with reference to "cæcal" hernia, in connection with which the appendix is often found. Hernia of the appendix occurs in both the inguinal and femoral varieties, and either alone or in conjunction with other portions of the abdominal viscera.

The following figures show the relative frequency of the appendix in abdominal hernias: Of 250 cases of radical cure of hernia by the Bassini method, reported by Hoffman, from the Albert Clinic, Vienna, the appendix was found in the sac 9 times. Of 1586 hernias operated upon in the clinic of Professor Colzi, Florence, the appendix was present in 27. Wassiljew reports 106 Bassini operations, in which the appendix was found 3 times. Coley met with the appendix, alone or with other viscera, 16 times in 1003 operations for the radical cure of hernia. Bundschuh (Heidelberg clinic) met with the appendix 3 times in 109 consecutive operations for strangulated femoral hernia. Combining these figures, the appendix was found 58 times in 3054 hernias,—once in about 53 cases. No figures are at hand to show the proportion of hernias in which the appendix alone is found in hernial sacs.

The relative frequency of pure appendicular inguinal and femoral hernias might be expected to preserve about the same ratio as that which exists between the usual forms of these two varieties, but the few figures at hand lead to a rather different conclusion. In Brieger's collection of 35 cases of hernia of the appendix, 20 were inguinal (19 right and 1 left), and 15 were femoral. In 98 cases, Bajardi found 54 inguinal and 44 femoral. Of 145 hernias containing the appendix alone and with other viscera collected by Spurrier and Corner, 71 were inguinal and 69 femoral.

In Gibbon's collection of 63 "cæcal hernias," 56 were inguinal and 7 were femoral. Of the latter, 4 (3 right and 1 left) contained in addition to the appendix, other portions of the bowel, while 3 (all right) contained the appendix only. Of the 56 inguinal hernias, 32 (28 right and 4 left) contained intestine in addition to the appendix, and in 9 (8 right and 1 left) the appendix alone was found. It will be observed that the appendix was present in all the femoral hernias, but was absent in 15 of the inguinal hernias. In this collection of "cæcal" hernias the ratio of the femoral to the inguinal variety is as 1 to 8; of pure "appendicular" hernia it is 1 to 3; in Spurrier and Corner's, it is about equal. In Brieger's collection (appendicular) it is 3 to 4; in Bajardi's (also appendicular) it is 4 to 5. It must be borne in mind that different collections of cases do not always lead to the same deductions, but as far as these limited figures may be accepted, they show that cæcal hernia is about 8 times as frequent in the inguinal variety as in the femoral, while in pure appendicular hernia, the proportion is nearly equal.

Another interesting point concerns the relative frequency of cæcal and appendicular hernia in the two sexes. Of Gibbon's 56 cases of inguinal hernia, but one occurred in a woman, and that was a pure appendicular hernia; therefore the table does not contain a single example of inguinal "cæcal" hernia in the female. The seven cases of femoral hernia all occurred in women. Spurrier and Corner's cases include only those in

which the appendix in a hernial sac gave rise to at least a part of the symptoms. Including both the inguinal and the femoral varieties, there were 52 males and 61 females.

Of the 100 cases of appendicular femoral hernia appended to this paper, 81 were in women, and 7 in men; the sex not being given in 12.

An important difference between cæcal and pure appendicular hernias concerns the age of the patients. Gibbon quotes the combined experience of Coley and Halsted (1898), a total of 642 herniotomies, in which the cæcum or appendix was found in the sac 21 times, and in but 3 of these was the patient over 15 years of age. It should be stated that 16 (but 1 being over 15 years of age) of these were reported by Coley, whose work has been largely among children. Of Gibbon's 63 cases, 36 were under 15 years of age, 5 between 15 and 40, 7 between 40 and 50, and 15 past 50 years. Over one-half, therefore, were less than 15 years of age, and 60 per cent. were under 40.

In marked contrast are the cases of appendicular hernia here reported. The age is given in 77 instances. The youngest patient was 19 years of age, five were in the third decade, five in the fourth, twenty-five in the fifth, eighteen in the sixth, thirteen in the seventh, nine in the eighth, and one in the ninth; the latter patient being aged 87 years. More than one-half of the patients were over 50 years of age, and over 85 per cent. were past 40 years. This varies slightly from the statement made by Spurrier and Corner, that the maximum frequency occurs in the sixth decade, although this refers to cases accompanied by intestine in the hernia.

Any consideration of the etiology of appendicular hernia must first admit a low position and a definite degree of mobility of the cæcum and appendix. Given these conditions, the subsequent steps will probably be determined by the attending circumstances. It is certain that all do not develop in the same way. From a study of the appended cases, it seems permissible to assume the following types:

1. The hernia (probably cæcum and appendix) develops in

the usual manner,—*i. e.*, it is either congenital, or a freely movable cæcum and appendix is situated low down, in contact with a weak internal abdominal ring, when some severe strain or jar, or a series of such accidents, develops the rupture. The hernia is at first reducible, and usually returns to the abdomen when the patient is in the recumbent position. If the hernia is not kept up by a truss, sooner or later the appendix becomes adherent to the sac. In this condition the hernia is but partially reducible, the bowel escaping from the abdomen to the hernial sac and returning, according to the position of the individual, while the appendix remains fixed. In these cases the patient frequently notes that "the lump gets smaller on lying down, but does not entirely disappear." Either as a result of wearing a truss, or of contraction of the neck of the sac from natural causes, the cæcum may cease to descend, leaving the appendix as the sole structure involved in the protrusion. The neck of the sac may continue to contract, causing incarceration or strangulation of the appendix, or the latter may become the seat of inflammation. In either of these conditions, acute symptoms develop promptly.

2. It is conceivable that a congenital hernia, or one occurring early in life, may appear to have cured,—that is, may cease to come down, but yet leave a sac and small, but patulous canal in which the appendix could engage under favorable circumstances. In some of the cases the abdominal symptoms,—pain, constipation, and vomiting,—indicating incarceration or strangulation of the appendix, occurred before the hernia was observed; in others the lump appeared some days or even weeks before the onset of acute symptoms. In either event, it would appear that there must have been a hernial sac present, or the appendix could not have escaped so freely and suddenly from the abdomen.

3. One is led to ask if a hernia is ever appendiceal primarily? The history of some of the cases appears to justify an affirmative reply (*vide* Cases 4 and 82). Whether an incomplete hernia exists, which suddenly becomes complete; or

whether the appendix, lying either in the inguinal or femoral fossa, is suddenly and forcibly protruded through the respective canal, carrying the adjacent parietal peritoneum before it, must probably remain a matter of conjecture. The writer believes the former is the more reasonable explanation.

The symptoms of appendicular femoral hernia as noted in the following cases, vary greatly: A lump was present in the groin in every instance. In some it had existed previously; in others, it first appeared with the onset of acute symptoms for which the operation was performed. An impulse on coughing was rarely noted at the time of onset of the acute symptoms. In a number of cases the lump was the only symptom, but the majority exhibited in addition one or more of the following: Fever, loss of appetite, nausea, vomiting, in some cases stercoraceous, constipation, colicky pains, violent hypogastric pain, distention, frequent and difficult micturition, drawing sensation in lower part of the abdomen, pain in the right hip joint, restricted movement of the thigh, and flexion of the thigh.

It seems worthy of mention that involvement of the appendix alone, in some instances, gave rise to symptoms characteristic of strangulated intestinal hernia,—*e.g.,* nausea, vomiting (even stercoraceous), constipation, and distention. This is evidently the result of reflex nerve action, as it is improbable that any organic obstruction is caused by the incarceration of the appendix. An unexpected manifestation was flexion, and restricted movement of the thigh. This condition is probably due to contraction of the appendix after it has become adherent to the sac, so that full extension of the thigh would make undue traction on the cæcum.

The duration of the acute symptoms was stated in 50 of the cases. It varied from a few hours to five weeks. The majority was less than three days; and three-fourths, five days or under. Of the more frequent symptoms, nausea is noted eleven times, vomiting twenty-five times, and constipation fifteen times.

The condition of the appendix was said to be normal, or nearly so (mere congestions included) in eleven, inflamed in four, adherent in seventeen, incarcerated in twenty-two, strangulated in eighteen, perforated in sixteen, ulcerated in five, gangrenous in twenty. It will be understood that two or more of these conditions were sometimes noted in the same case.

In 52 instances the appendix was removed; of these, three died. In 17, the appendix was reduced; all recovered but one. There were 8 other fatal cases, but in these the disposition of the appendix is not given.

In his work on appendicitis, page 186, Sonnenburg says he does not accept the view that a "normal" appendix becomes strangulated. The latter condition, in his opinion, is always due to inflammation. Wulff takes the opposite view, claiming, in his case, that the appendix was perfectly normal except for the constriction and its results. I believe the weight of the argument is against Sonnenburg. Some difference of opinion may arise from the rather confusing and sometimes indiscriminate manner in which the terms "incarceration" and "strangulation" are employed. But as the second condition is simply an advanced stage of the first, no sharp distinction need be drawn in the present discussion.

One may well imagine a small hernial orifice barely large enough to admit the appendix into which the latter may become engaged during some violent effort of the individual. Owing to the dependent position and perhaps the pressure of organs above, the circulation of the appendix is somewhat embarrassed, and slight swelling ensues. This causes a little constriction at the neck of the sac, and still greater swelling results, each condition aggravating the other. In the presence of marked congestions, as is well known, inflammation of the appendix is easily established. In this way the inflammatory cases are explained. It is equally obvious that an appendix in the sac of a hernia may become inflamed from other causes, resulting in swelling and subsequent strangulation.

That it is unsafe to assume that every case of incarcerated or strangulated appendix is inflamed, appears from a reference to the cases. In 17 instances the appendix was returned to the abdomen, and but one death followed. This was reported by Dieffenbach in 1848. In this case the appendix was clearly not in a condition suitable for reduction. If the naked-eye appearances may be trusted, the appendix was normal in a number of instances; it is also significant that no trouble resulted in the 16 cases in which reduction was performed. Surely some of them would have given symptoms if they had been returned to the abdomen in an inflamed condition.

There appears to be no sign by which appendicular hernias may be recognized. In my first case the conditions suggested an abscess; in the second, the sac was so tense that no information as to its contents could be obtained. Coley has been able to recognize the appendix in the hernial sac by palpation, but this would manifestly be possible in but a few of the cases. Usually tension, fluid or inflammation would interfere with this test. Both Koelliker and Muus are of the opinion that the presence of the appendix in the hernial sac causes the patient to walk with the body inclined forward, and that this posture is an important aid in making the diagnosis. This symptom can be explained only by assuming that the appendix is adherent to the sac and that when the patient attempts to take the full, erect attitude, traction is transmitted from the mesocolon, through the cæcum, to the appendix. This condition was noted in a few instances, but so infrequently that it cannot be looked upon as a symptom, except in those cases in which adhesions, incarceration, or strangulation exists. It is not probable, therefore, that many of these cases will be recognized before operation.

The treatment of hernias in general is divided into the palliative and the radical, and the appendicular hernia if recognized would be treated upon the same lines as the other forms.

The proper disposition of the appendix, when found at operation in the sac of a hernia, must be decided by a consideration of both the general and local conditions.

In discussing treatment, the cases may roughly be divided into three classes:

First.—Those in which the appendix is normal or but slightly congested from mild constriction. In this class, removal of the appendix is to be preferred, if the attending conditions are favorable; that is, if the entire process and its attachment to the cæcum can be exposed in the wound, rendering the operation easy, and free from risk to the patient. This is much more apt to be the case in inguinal than in femoral hernias. When the base of the appendix cannot be exposed, the hernial canal may be enlarged by a small incision, if the patient's general condition justifies prolonging the operation. (See Case 99.) Cases will be met with in which this additional interference will be contraindicated, as in Case 99. In such instances, the appendix may safely be returned, if in a normal condition, as pointed out above. In older subjects the danger of subsequent appendicitis is much less than it is before middle life. A radical cure should be attempted whether the appendix be returned to the abdomen or removed.

Second.—Cases in which the appendix is firmly adherent to the sac, or is the seat of distinct inflammation. In these instances the organ must be removed, as the danger of returning it would be greater than the risk attending its removal. Great care is necessary, in the highly inflammatory cases, to avoid infecting the peritoneal cavity. A radical cure should conclude the operation, unless the amount of infection present demands free drainage.

Third.—Cases in which the appendix has perforated and fecal matter has escaped into the sac, or in which an abscess has formed. In this class the greatest nicety of judgment and precision of operative technique will be required to deal effectively with the conditions and yet avoid infecting the peritoneum. When the distal portion only is involved, it may be possible to ligate at the base and remove the affected part. In the particularly bad cases the sac should be laid open widely and sponged out carefully; the appendix should then be drawn out

as far as possible and held in this position by sutures. In this way, the abdominal cavity is shut off. Of course, this presupposes that the peritoneum has not already become infected. In these cases the external wound must not be sutured, but should be allowed to heal by granulation. In many instances the wound will heal leaving the cæcum adherent at the internal hernial orifice, which, as a rule, will cause no inconvenience; or a fecal fistula may remain, which can be closed by operation at an appropriate time subsequently.

A study of the cases that follow will show that:

1. Appendicular hernia is more frequent than has been supposed.

2. When occurring in conjunction with the cæcum, no special considerations may be involved; but when occupying the sac alone new problems of treatment are introduced.

3. The appendix is more apt to be found in femoral than inguinal hernias. It has occasionally been observed on the left side.

4. A herniated appendix is apt to become adherent and inflamed, and, as a matter of clinical experience, this danger appears to be greater when it occupies the sac alone than when it is accompanied by other portions of the intestine.

5. The diagnosis of appendicular hernia has not been made, as a rule, before operation.

6. In all cases operated upon it is desirable to remove the appendix unless the patient's general condition or safety contraindicates this course.

REFERENCES.

1. Aly (Münch. Med. Woch., 1898, 45, 1656) reports a case in which the vermiform appendix had a perforation at its apex. The entire appendix was found in the sac of a femoral hernia. Result not stated.

2. Annandale (Lancet, London, March 30, 1889, page 627). Mrs. M., aged 60 years, noticed a swelling in right groin twenty years before, but it gave no trouble. Thirteen days ago the swelling increased in size, became tender, and caused a little fever. Soothing applications were applied. A diffuse inflammatory swelling was present in right groin and all signs of diffuse suppuration; some nausea, but no obstruction. Operation: Free incision, keeping in view history of hernia. Cavity, not markedly circumscribed, contained pus and blood. Well-defined round

tumor, size of a mandarin orange, exposed. This proved to be sac of a femoral hernia; walls much thickened by inflammation. Sac opened; pus and blood flowed out. Only other object was appendix, thickened and congested. Base firmly adherent to inner aspect of neck of sac, and thoroughly plugged it. Base of sac and appendix firmly ligatured with catgut and cut away. Base of stump sutured by two or three subcutaneous sutures as in radical cure. Wound soundly healed January 19.

Appendix removed measured three and a-half inches Small perforation about one inch from tip.

3. BAJARDI (Lo Sperimentale, 1895, 330) reports the case of a woman of 42, with a right femoral hernia and the phenomena of incarceration and inflammation. Herniotomy was performed; the sac was found to be one mass of exudate, in the midst of which was an adherent appendix. This was excised, the sac sutured, and drainage inserted. The patient recovered.

4. BARTH (Deut. Zeit. f. Chir. 1902, 149) reports the case of a woman of 80, who had been suddenly taken with pain in the upper part of the right thigh while lifting a heavy load. There were nausea, loss of appetite, vomiting, absolute constipation, and inability to pass flatus; also colicky pains, especially in the lower part of the abdomen. Eight days after the appearance of these symptoms, a diagnosis of incarcerated femoral hernia was made. At that time the mass was the size of a pigeon's egg. The skin was slightly movable and not reddened. The tumor was hard, and swollen lymph-glands surrounded it. Palpation was painful. There was some distention of the abdomen. The patient had never suffered with a rupture before. The operation was performed on the eighth day, under Schleich's anæsthesia, and some swollen lymph-glands were removed. Upon opening the hernial sac, turbid fluid escaped. The only structure in the sac was a loop of the vermiform appendix, 10 cm. long, gangrenous, and much distended. The incarceration was so tight that it was difficult to pass a probe alongside of the appendix. There were no adhesions except in the neighborhood of the internal ring. By breaking these up, a small abscess, containing foul-smelling green pus, was opened. The appendix was amputated. The resected appendix was 16 cm. long, 10 of which were incarcerated. The patient died some weeks later, of senility.

5. BATTLE (Lancet, 1899, 1, 1223). Woman, aged 59; swelling in right groin for five years. It caused some difficulty at one time, which subsided in three weeks. Ten days ago it reappeared without apparent reason. Pain, no vomiting, no constipation, mass irreducible, pressure in right iliac fossa caused sensation of dragging on swelling, no fluctuation. Operation: Some inflamed glands; appendix in sac. Appendix and adherent sac removed. Recovery.

6. BAYER (Centralbl. f. Chir., 1876, vol. xxxi, page 689). Appendix strangulated in right femoral sac. Local pain and swelling. (Quoted by Eccles.)

7. BAYER (Prag. med. Woch., 1886, xi, 221) reports the case of a woman of 27 years, who complained of having had a small mass in the

right groin for several weeks. Its origin was unknown. There was pain radiating along the right limb and the right side of the abdomen. The patient was able to pass gas and stools. She could not move the right leg as freely as usual; the mass enlarged gradually. A diagnosis of hernia was made. The hernia was irreducible and inflamed. An incision was made over the mass, and the hernial sac was found to contain bloody, serous fluid. The hernial contents consisted of fibrin and a small piece of intestine, circularly constricted at the hernial neck. The loop was the size of the little finger, and not movable. The crural ring was split, the adhesions severed, and the loop of intestine found to be a small portion of the vermiform appendix. This was reduced, and the patient recovered. The wound was permitted to granulate.

8. BENDER (Bull. et Mem. de la Soc. Anatom. de Paris, 1900, vol. lxxv, 756). The patient was a woman, with a tumor the size of a nut on the inner side of the right thigh. It was hard, painful, and dull on percussion. There was no impulse on coughing. A diagnosis of inguinal adenitis was made; hernia being excluded by the absence of impulse.

Suddenly, violent abdominal pain was felt, followed by distention and absolute constipation. The diagnosis of strangulated femoral hernia was then made, and operation performed. The sac contained a quantity of yellowish fluid and the appendix. The latter, which was ligated and removed, measured 12 cm. In the tip a little pus was found. The patient recovered.

9. BENNET (Med. and Surg. Reporter, Phila., 1882, vol. 47, 396). Man, aged 64 years; lump in right groin for three years. On February 9, 1881, violent pains in hypogastrium. Called physician, who found lump size of hen's egg in right groin. Not painful; felt like large glands. Supposed to be hernia.

Taxis, laxatives, enema, etc., all ineffectual, but latter caused pain. Vomiting set in and became stercoraceous on 11th. Operation on 12th: Free end of appendix in *gangrenous* condition in femoral hernia. Patient recovered.

10. BIDWELL (Trans. Clin. Soc. 1897, xxx, 186). Woman, aged 50; reducible right femoral hernia for seven years; for past fourteen days it was irreducible; no symptoms of strangulation. The hernia was tense, the size of a hen's egg, and slightly tender. Hernial sac contained clear fluid, one and a half inches of normal appendix in the sac; reduction, radical operation. Recovery.

11. IBID. Woman, aged 60; right femoral hernia for five weeks; came down suddenly; irreducible, tense, hernial sac size of hen's egg; contained clear fluid. One inch of normal vermiform in sac; reduction; radical operation. Recovery.

12. BRIANCON (Thèse de Paris, 1897). Woman, aged 42; an irreducible, incarcerated, painful right femoral hernia, developed suddenly. At operation the sac was found to contain an ulcerated appendix. The patient recovered.

13. IBID. Woman, aged 45 years; had a right femoral hernia for two

years, which suddenly became incarcerated. At operation the hernial sac was found to contain an incarcerated appendix, 15 cm. long. It was obliterated below the point of incarceration. The appendix was removed. The patient recovered.

14. IBID. A woman had had a right femoral hernia for a few years. Symptoms of strangulation developed suddenly. At operation the inflamed appendix was found in the hernial sac. Appendectomy. The patient recovered.

15 BRIEGER (Archiv f. klin. Chir., 1893, xlv, 892) reports the following case: A woman had pain, with frequent and difficult micturition. In the right groin there was a mass the size of a walnut. The skin was not changed. The operation showed within the hernial sac a cord 2½ cm. long. When pulled out, this was found to be the vermiform appendix. It was removed, and the patient recovered. It was somewhat thickened and pale-red. The amount of constriction was very slight.

16. BROHLE (Münch. med. Woch., 1887, xxxiv, 506) reports the case of a woman of 72 years, who had had a small hernia of the right femoral region for several years. It had always been irreducible. It was as large as a hen's egg and painful to touch. Incision over the mass evacuated ill-smelling pus. The pus came from glands that had broken down. One of the glands was attached to a string, which passed through the femoral canal and seemed to be continuous into the peritoneal cavity. The hernial sac was opened and the string was found to be the vermiform appendix. It was adherent to a gland. It could be torn, and from its interior, foul-smelling pus was evacuated. The appendix was removed and the stump reduced. The patient died 23 days later.

17. BRUNNER (Beitr. z. klin. Chir., 1889, iv, 18) reports the case of a woman of 59, who complained of having had colicky pains for six years. The cause of these was not known. They came, as a rule, suddenly, remained several hours, and disappeared after she had vomited a quantity of bile. She had had for the same length of time a tumor of the size of a walnut over the upper part of the right thigh. It was not completely reducible. When seen by the author, she had had for two days intense pain associated with bilious vomiting. The small mass was swollen and not very tender. The skin over it was red and infiltrated. Through the skin there could be felt a cord passing upward into the abdomen. A diagnosis of suppurating, incarcerated femoral hernia was made. Incision over the mass revealed, after cutting through some strictures, a space lined with a greenish membrane. A fecal odor arose from it. Along the mass the finger entered the abdominal cavity. The mass was found to have an opening the size of a pea, through which fecal masses were escaping. Close examination showed it to be the vermiform appendix. It was removed and the hernial opening was packed. The patient died.

18. BUNDSCHUH (Beitr. z. klin. Chir., 1901, xxxi, 425) reports the case of a woman of 53, who had had a right femoral rupture since childhood. While lifting a heavy tub, she experienced pain in the groin. The hernia

was incarcerated for eight days. She vomited once, and there was inability to reduce the hernia. Herniotomy and a radical operation were performed. The hernial sac was thickened; the vermiform appendix was adherent to the upper part of the hernial sac; the lymph-glands were adherent; and there was some omentum, which was replaced. The patient recovered.

19. IBID. In the second case, the patient was a woman of 60, who had had a right femoral hernia for two years. She had suffered much from coughing. While carrying a heavy bucket, incarceration took place. There was violent pain and nausea, and a mass the size of a nut appeared. The incarceration lasted three days. Herniotomy and resection of the adherent vermiform appendix, which was 6 cm. long, were performed; also a radical operation. The hernial fluid was turbid. Some hemorrhagic omentum was resected, and the patient recovered.

20. CABARET (Jour. des connaissances medico-chirurgicales, 1842, x, 54) reports the case of a woman of 60, who, without any known cause, began to vomit and had colic. There was no history of any hernia. The abdomen was tender and tense, and the next day a right-sided femoral hernia suddenly appeared and could not be reduced. It was the size of a pigeon's egg, and very sensitive. The hernial sac was opened, and in it was found the appendix, which was three fingers' breadth long, swollen reddish-brown, and strangulated. The strangulation was produced by the femoral ring. Gimbernat's ligament was cut through, and the appendix was reduced. The patient recovered.

21. CRUVEILHIER (Anat. pathologique, 1835, Liv., xxxvii, Planché 6) reports the case of a woman, 50 years of age, who had a fluctuating phlegmonous tumor of the right groin, the size of an orange. The skin over it was inflamed. An incision over the tumor evacuated a large quantity of very offensive pus. The intestine [appendix] was gangrenous. Improvement followed the operation, but the patient died two months later. Autopsy revealed the cæcum to be attached to the crural ring, in which the appendix was engaged. The latter was adherent to the posterior wall of the sac and was perforated near its apex.

22. DANZEL (Zeit. der Aerzte zu Wien., 1859, 209) reports the case of a woman of 61, who, for three days, had had symptoms of strangulation. The abdomen was distended; there was absolute constipation, and vomiting. Taxis had been performed for some time. The author found a large, right-sided femoral hernia, tensely distended and painful. The skin was reddened. An incision over the region of the hernia revealed fetid pus. The cavity was drained and the patient put to bed. An improvement was noticeable within a few days. On the twelfth day, a grayish-black mass was removed from the wound in the course of dressing, and was found to be the vermiform appendix. In addition to this, small masses of fæces were discharged. The patient recovered with a small fecal fistula.

23. DAVIES-COLLEY (Guy's Hospital Rep., 3d Series, vol. 27, 1884). Woman, aged 38 years, admitted to Guy's Hospital October 2, 1883; married; eight children, youngest two and a-half years. Twelve months

ago while lifting a heavy basket she felt a sudden pain in right groin, followed by vomiting. Symptoms soon subsided, but recurred from time to time. On a second occasion she felt a small lump in groin; always able to return lump, and pain never lasted over one hour. Sometimes the hernia would not come down for two or three months. September 30, in chapel, 6 P.M., sudden attack of pain, and felt lump in groin; on arriving home unable to return lump as before. Vomiting at 9 P.M., and continued next day. Taxis, evening of October 1, unsuccessful. Taxis applied unsuccessfully a second time. Bowels moved on 30th, twice October 1, and once (slightly) on 2d.

Swelling over right femoral ring, globular, one to one and a quarter inches in each direction. Rather movable; no impulse on coughing. Thought to be gland, or strangulation of omentum, or part of calibre of bowel.

Sac was incised. Appendix found, coiled up, three inches long, normal thickness, and little altered in appearance, except that there was a blood-clot under the peritoneal coat, one inch from tip. Internal border of femoral ring was notched, and the appendix returned. Sides of sac brought together with catgut and wire sutures in skin. No fluid or omentum in sac. Recovery.

24. IBID (page 436). Woman, aged 47 years, admitted to hospital, May 14, 1884. Married; fourteen children. Lately had a sensation of weakness over abdomen and chest.

December 24, 1883, after day's hard work, noticed a swelling in right groin which came down suddenly and caused great pain. Swelling reduced by doctor. No more trouble until May 9, when lump again appeared while she was walking and coughing; 11th, bowels opened and taxis applied twice; 13th, taxis again applied. Vomiting began. In the right groin below Poupart's ligament an ovoid swelling two inches in circumference. No impulse on coughing; abdomen tender. On opening what was thought to be sac, two ounces of serous fluid escaped. A knuckle appeared, and on scratching surface a second flow of fluid having fetor, but no color. In the sac was an object covered with gray lymph which proved to be the appendix. Appendix ligated at base and the swelling caused by inflammation. Recovery.

25. DIEFFENBACH (Die operative Chir., 1848, ii, 600) reports the case of a man about 60 years of age, with no history of ever having had a rupture. He suddenly became ill. There was nausea, belching, and a drawing sensation in the lower part of the abdomen. The bowels were regular. The hernial region was free. By pressing over the right femoral ring, dull pain was elicited. Laxatives, leeches, and applications were used without improving the condition. Operation disclosed at the femoral ring a very small mass, the size of a small bean, protruding from the ring, and resembling peritoneum. The membrane was opened and was found to be connected with a blackish-gray, folded body. When loosened, this was seen to be the end of the vermiform appendix. It was

adherent. Gimbernat's ligament was cut through, and the appendix was reduced. The patient died.

26. Eccles (St. Bartholomew's Hospital Reports, vol. xxxii, 1896). Woman, aged 48, hernia, right femoral, for eleven years. Admitted to hospital for an irreducible swelling in the right groin. No impulse on coughing, but fluctuation was present. Skin tender and inflamed. Patient never had vomiting, but was constipated.

Herniotomy: One inch of appendix, dark and thickened, was adherent to mouth of sac. Ligated and removed. The strangulation was due to the swelling caused by inflammation. Recovery.

27. Ibid (Trans. Path. Soc., London, 1896-97) reports Gee's case. Man, aged 41 years, died from carcinoma of stomach. At postmortem the appendix was found to be five inches long; four inches within abdomen, and the distal inch in sac of right femoral hernia, adherent at its mouth, and the free extremity somewhat dilated. No previous history in the case.

28. Floel (Deut. Zeitschr. f. Chir., 1891, xxxii, 587) reports the case of a woman of 50, who was suddenly seized with violent pain in the upper part of the right thigh. The pain continued, and a small mass appeared. There was no vomiting. The mass was found to be a hernia, which was irreducible and incarcerated. It was tender to touch and the size of a pigeon's egg. The skin over it was not changed. An incarcerated crural hernia containing omentum was diagnosed. A longitudinal incision was made, and the mass rendered free on all sides. It was found to be continuous with a pedicle through the femoral canal. This pedicle entered the mass, the centre of which was found to be a hernial sac. The pedicle was found to be the vermiform appendix. It was incarcerated, was brownish-black, and had a fetid odor. No fluid escaped. The femoral canal was dilated; the appendix was removed. It was 6 cm. long and not perforated. The patient recovered.

29. Good (British Med. Journal, 1898, ii, 876). Woman, aged 39; tense swelling in right groin; existed for 24 hours; pain and vomiting. Diagnosis: Irreducible, strangulated, femoral hernia. Operation: Hernial sac opened; it continued the vermiform appendix, strangulated and congested; five inches of the process were in the sac and two inches in the abdominal cavity; one inch was gangrenous; this was resected. Patient recovered.

30. Guinard (Bull. de la Soc. Anat. de Paris, 1896, lxxi, p. 451). Woman, aged 45 years, who had had a small femoral hernia, was suddenly seized with abdominal pain, and the hernia became irreducible. There were no symptoms of intestinal obstruction. Celiotomy was performed, and the appendix doubled upon itself was found to occupy the femoral canal and hernial sac. The proximal and distal extremities of the appendix remained in the abdominal cavity. The patient recovered.

31. Heusinger (Mag. f. d. Gesammte Heilk., 1820; quoted by Bajardi) reports the case of a man complaining of colicky pain that had come on suddenly. The patient died four days later. At the

autopsy, a suppurative peritonitis was found in the crural canal; the vermiform appendix was discovered, adherent and surrounded with a mass of pus.

32. HEVIN (Cours de Path. et de Therap. chirurgicale, 1785, p. 407) reports a case of right femoral hernia with symptoms of incarceration. The femoral sac opened and pus with a fecal odor escaped. In the sac was a gangrenous piece of intestine. The patient died, and the autopsy showed the intestine to be the vermiform appendix.

33. HONSELL (Beiträge zur klin. Chir., 1903, xxxvii, 208) reports the case of a woman of 46 years, who had had a small hernia in the upper part of the right thigh, which had been reducible until two days before. There had been violent pain since that time, but no vomiting. The mass was the size of a walnut, and it was painful, tender, and irreducible. An operation was performed under local anæsthesia. A vertical incision was made, and the hernial sac isolated and opened. It contained a clear yellowish fluid. In the sac, the bluish-red, slightly swollen vermiform appendix was found. Poupart's ligament was severed, relieving the constriction. Reduction was then accomplished. The cyanotic discoloration of the peripheral portion disappeared after the reduction. Radical operation for the cure of the hernia was performed, and the patient recovered.

34. The second patient was a woman of 53 years, who had a hernia that had developed suddenly in the right side of the thigh while she was loading hay. There was violent pain, and a small, tender mass appeared. There was repeated vomiting, and flatus, but no stool could be passed for some days. An incision was made over the mass, the hernial sac was opened, and the constricting ring divided. The opening of the sac disclosed bloody fluid. Wiithin the sac was the appendix, together with its mesentery. The strangulation was from 1½ to 2 cm. from the cæcum. A distinct constriction of the appendix and of the mesentery was present. The strangulated part was brownish-red and covered with hemorrhagic spots. The appendix was resected and a radical operation for the hernia was performed. The patient recovered.

35. In the third case, the patient was a woman of 54, who had had a right-sided femoral hernia for many years. It could be easily replaced until four days before, when, while ploughing, the hernia became irreducible. There was violent pain about the thigh; no stool or flatus was passed for several days; no vomiting. The mass was the size of a walnut, fluctuating and tender. It could be traced beneath Poupart's ligament. The skin over it was perfectly normal. Under local anæsthesia an incision was made, and the tumor freed. The hernial sac was only about the size of a cherry. It contained several drops of serous fluid, and a folded black structure, which passed through the narrow hernial opening. Poupart's ligament was incised and also the hernial neck. The structure mentioned was found to be the vermiform appendix with its end twisted on itself; 5 cm. of the appendix was gangrenous, 2 cm. normal. Between these two parts was a deep constriction-ring. The

appendix was resected; a radical operation for the hernia was performed, and the patient recovered.

36. The fourth patient was a woman of 55, who had had a right-sided femoral hernia for several years. It had been easily reducible. For eight days it had been painful and could not be reduced; and neither stool nor flatus had been passed since. There was a tumor the size of a hen's egg, tense, elastic, and painful. The skin over it was slightly edematous. Resistance could be traced below, beneath, and above Poupart's ligament. Under local anæsthesia the hernial sac was isolated and opened. A tablespoonful of turbid, foul-smelling fluid was found. A tough incarcerated piece of tissue, the size of a bean, lay on the floor of the hernial sac. Poupart's ligament and the abdominal covering were severed, and the peritoneal cavity entered. The insertion of the appendix lay above the hernial ring, as did also its tip; but the central portion was within the femoral canal. The mesentery acted as the constricting element. The constricted portion was from 2 to 3 cm. long, and showed two deep furrows. It was blackish and looked gangrenous. No perforation could be found. The appendix was resected, and a radical operation performed. The patient recovered.

37, 38, 39. HUETER (Chir., 1882, ii, 559) says he has seen three cases of right-sided femoral hernia containing the vermiform appendix.

40. JACKLE (Diss. Marburg, 1888) describes the case of a woman of 37 years, with a small strangulated and gangrenous-appearing hernia of the right femoral region. There was no fecal vomiting. The skin over the hernia was reddened. An incision was made, and brown, ill-smelling fluid escaped. A small perforated intestinal loop was found. It was partly adherent to its surroundings and covered with pseudo-membrane. The femoral ring was narrow. A close examination revealed the fact that the incarcerated portion of the intestine was the beginning of the appendix. The point of strangulation was 2 cm. from the apex. The appendix was ligated and removed, and the patient recovered.

41. JACOBSON (The Operations of Surgery, 1897, 637). Woman, aged 43; irreducible femoral hernia; radical cure. Hernial sac contained much fluid; in sac a thick fleshy body, tubular at end; constricted near Gimbernat's ligament. Incision of ligament; reduction of appendix. Recovery.

42. KASINOWSKI (Diss. Greifswald, 1871). Woman, 35 years of age, awoke two days previously with vomiting, pain in the right side, and obstruction of the bowels. A right-sided incarcerated femoral hernia the size of a walnut was found. It was tender on pressure. At operation a small amount of fluid and a healthy appendix was found in the sac. The appendix was reduced. The patient recovered.

43. A second case reported by the same author, and quoted by Bajardi, is that of a woman of 44 years, with a right femoral hernia, which had been incarcerated for two days. There was a right-sided vaginal hydrocele, and vomiting occurred. Herniotomy was done. The sac was found to contain a quantity of turbid fluid having a fecal odor. The appendix

was reddish, long, and partly within the peritoneal cavity and partly within the sac. The sac and a part of the appendix were removed. The patient recovered.

44. KEETLEY (Med. Press and Circ., 1890, vol. i, page 85). Woman, aged 53 years. Appendix strangulated in right femoral sac. Patient vomited three times. Herniotomy four days later. No definite peritoneal sac found. Appendix thickened, white, and contained much pus. Ligated and removed. Good recovery.

45. KOELLIKER (Cent. f. Chir., 1901, xxviii, 792) reports the case of a woman of 69, with the right limb flexed at the hip-joint, resembling a patient with coxitis. She could walk only with the aid of a cane; and all attempts to straighten the limb, even while lying on her back, produced violent pain in the lower part of the abdomen on the right side. Her femoral hernia could not be reduced. Operation showed the sac to contain a thickened omentum, adherent to the neck of the sac. In the base of the sac was a very long appendix, adherent at its free end. The appendix was very tense during narcosis, as the limb was straightened. No other intestine was found in the sac. The appendix and the omentum were resected and a radical operation for the hernia was peformed. Recovery (not stated, but apparent).

46. KOERTE (Deut. med Woch., 1901, xxvii, 176, v.) remarks that twice within a year he has operated on incarcerated appendices in small, narrow, crural herniæ. He has no doubt whatever that in each case an incarceration existed, without inflammation. In each case the appendix had a distinct furrow, and the mesentery was hemorrhagically infarcted. There was no suppuration; neither was there a foreign body, a fecal stone, or anything else of that sort. In one case, the patient was an old woman, who had had an adherent omental hernia for some time. An acute incarceration forced operation three days after the beginning of the symptoms, and in the hernial sac the appendix markedly altered, was found.

47. The second patient was a young woman, who did not know anything concerning the existence of a femoral hernia. Suddenly, one morning, she had an incarceration. She was operated on twelve hours after the incarceration, and from the signs, it was evidently a very recent condition. The author is therefore convinced that these cases were pure incarcerations of appendices, and not inflammations of appendices situated within the hernial sac. Result not stated in either case.

48. KOERTE also reports the case of a woman who had had a rupture for some time. It had not been replaceable for several days. She came to the hospital complaining that she had some belching, but no pain. Distinct symptoms of strangulation were missing; but at the operation the author found an appendix sharply strangulated, with its apex on the point of becoming gangrenous.

49. In another case operated on by him, a gangrenous appendix was found in the hernia. Result not stated in either case.

50. LANGDON (St. Bartholomew's Hospital Reports, 1891, page 179).

Woman, aged 46 years; appendix in right femoral sac; sudden onset of symptoms twelve hours before operation; vomiting, but loose motions. Herniotomy: sac much thickened. Appendix ulcerated and perforated; removed. Patient recovered.

51. LANGENBECK (quoted by Israel, Deut. med. Woch., 1901, xxvii, v. 177) operated upon a femoral hernia on account of symptoms of incarceration, and found in it, to his astonishment, a strangulated, incarcerated appendix. Result not stated.

52. LEVY (Arch. provinciales de Chir., 1903, xii, 393) reports the case of a woman of 63 years, who had had a small, right-sided femoral hernia for thirteen years. A short time before, after a violent attack of coughing, the hernia had become painful, the pain not permitting the patient to sleep during the night. The mass grew and was found to be irreducible. It was the size of a hen's egg. The skin was tense and very tender, but there was no œdema. An incision was made, and the sac was opened. Serous liquid of a reddish color escaped. The contents of the hernial sac were found to be the appendix, which was very long, swollen, congested, and curved upon itself. It was found to be strangulated at the femoral ring. The appendix was resected and the patient recovered.

53. The second case was that of a woman of 73 years, who had had a small mass in the right groin for two months. It had been gradually increasing in volume, and was the size of a large chestnut. It was not reducible. There had been pain until the last four days. The mass was hard and tender, and the patient had been vomiting several times a day. There was no constipation. Fluctuation was noted and also mobility. A longitudinal incision was made; upon opening the sac a yellowish liquid escaped. The hernial contents were a small piece of intestine, which was gangrenous. The crural ring was stretched, and the piece of intestine escaped into the abdominal cavity. Celiotomy was performed. The gangrenous piece of intestine was found to be the appendix. It was removed and the wound was drained. The patient recovered.

54. LINDNER (Deut. Med. Woch., 1900, xxvi, 259 v.) reports a right femoral hernia that, upon opening, was found to contain a small piece of intestine, which was discovered to be the appendix. It was easily liberated and replaced. On sewing up the femoral canal, fæces suddenly entered it from the abdominal cavity. A laparotomy was performed, and the appendix was discovered to contain two perforations. It was distinctly necrosed and had evidently perforated only a few moments before. The patient died. It was evident that, as the result of the incarceration, a nutritional disturbance developed, and that this produced the ulceration.

55. LOEBKER (Greifswald, 1884, quoted by Bajardi) reports the case of a woman of 41 years, with an old, right femoral hernia that had been incarcerated for two days. Herniotomy revealed a partially gangrenous appendix in the lower angle of the sac. The appendix was ligated and removed, and the patient recovered.

56. Lucas (Guy's Hospital Reports, 1884, p. 436) reports the case of a woman of 47, who for the last five months had had a right-sided femoral hernia the size of a walnut. Repeated attempts at reduction were futile, and vomiting began soon afterward. She had had no movement of the bowels for several days when seen; the tumor was egg-shaped, having a circumference of two inches. On opening, it was found to contain two ounces of serous fluid, and in the sac was the perforated appendix, which was as thick as the little finger. It was ligated and removed; the patient recovered.

57. Luschka (Virchow's Archiv, 1854, vi, 409) examined the body of a woman of 50 years, who had died of pneumonia, and found that she had had femoral hernia on the right side. Within it was found the appendix, twisted on its axis and constricted at its cæcal end.

58. Michailow (Russki Chirurgitscheski, 1895, No. 2) reports the case of a man of 48 years, who had developed sudden pain three weeks before, while lifting a heavy weight. A tumor appeared below Poupart's ligament. At first there was vomiting, and no stool was passed for seven days, after which time the bowels acted. The tumor was the size of a walnut, and extending upward from it an oval mass could be sharply defined. An operation was performed. The hernial sac was opened, and a black body resembling intestines was found. When separated from the hernial walls, this ruptured; and from it came pus smelling like fæces. An incision 10 cm. into the abdomen was made, and the body was found to be the inflamed and perforated appendix. It was resected, and the patient recovered.

59. Morse (Wien. med. Woch., 1882, xxxii, 431) reports the case of a woman of 42 years, who had had a right-sided femoral hernia for three days. There was violent pain and a tumor, which gradually increased in size and was irreducible. Symptoms of incarceration occurred. The skin was not reddened. The mass was quite tender. An incision over it was made, and the femoral sac exposed. The femoral canal and sac were opened and inside was found the reddened appendix, which was gangrenous. This was resected. The patient recovered.

60. Motta (Ital. med., 1882, xvi, 57; quoted by Bajardi) describes the case of a woman of 76 years, with a right femoral hernia that had been incarcerated for three days. There was vomiting; the bowels were moved by means of enemata. In the femoral region there was an elastic tumor, painful and tense. Along the horizontal ramus of the pubis was a tight cord, prolonged upward into the abdominal cavity. Herniotomy was performed. The sac contained a resistant cord, grayish, about the size of the thumb, and terminating in an expansion the size of a nut. The constriction was relieved by incision. The dilated part was excised. The peduncle was found to extend up into the abdomen. The patient died seven days later, of general peritonitis. The autopsy showed the cord to have a central canal, which commuunicated with the intestine.

61. Mueller (Diss. Muenchen, 1891). Woman, 75 years of age, three days ago developed a right femoral hernia, at stool. There was violent

pain, and a tender elastic swelling in the groin. Diagnosis: Incarcerated femoral hernia. At operation the hernial sac was found to contain the appendix, which was of a bluish color. The appendix was returned to the abdomen. The patient recovered.

62. MUENCH (Korrespondenzblatt f. schweizer Aerzte, 1902, xxxii, 237) reports the case of a woman of 73 years, who had had a right-sided femoral hernia for many years. It had always been irreducible. There had been no disturbance, however, until a few days before the author saw her. Since then it had become larger and painful; there was no vomiting; flatus, stools, and urine, were evacuated regularly. A round, hard mass was noted in the upper part of the right thigh; it was tender to touch; the skin was almost adherent; there was no fluctuation. Local anæsthesia with eucaine was administered. While trying to liberate the hernial sac, ill-smelling pus was evacuated from the posterior surface of the mass. After opening the hernial sac it was found that its only contents were a 12-cm.-long appendix, which passed through the femoral canal. This was resected at a point as high as possible. The patient recovered. A pathological examination showed the appendix to have been perforated.

63. MUUS (Cent. f. Chir., 1901, xxviii, 1037) reports the case of a woman of 64 years, who for years had had a right femoral hernia, which was always easily replaced. A small tumor was always present, preventing the wearing of a truss. During the last month, the hernia had become more painful, forcing the patient to walk in a bent position. When lying on her back the right limb was flexed about 30°; and, on account of pain, she could not stretch it any more. There was very little pain on direct pressure. Operation showed a small lipoma in front of the hernial sac, which contained a healthy, adherent appendix. This was resected; radical operation was performed, and the patient recovered. From this time on she could stretch her limb perfectly.

64. NEWBOLT (British Med. Journ., 1867, i, 781). Woman, aged 21, painful swelling in right groin; had a femoral hernia for two years; always easily reduced. Incarceration for 48 hours; swelling size of hen's egg, hard, tense, tender, irreducible. No bowel movement for three days. Operation: Hernial sac contained vermiform, thickened, congested. Resection of congested part. Reduction of stump. Radical operation. Recovery.

65. NICOLL (Glasgow Med. Journal, 1903, lx, 432). Woman; right femoral hernia for many years; for past three days strangulated; painful, tense; constipation, vomiting, abdominal distention, bowels moved with enema. Sac contained feculent pus; the perforated appendix was adherent to neck. Resection. Recovery. Inflammation apparently occurred in appendix which had previously been in sac.

66. OWEN (Lancet, 1899, i, 1222). Woman, aged 65; painful swelling existed in right groin for two weeks, increasing in size; bowels regular; no vomiting. The swelling was as large as the fist, hard, but fluctuating in lower part. Abscess opened and contents cleared out; at the bottom

the vermiform was found, strangulated at femoral ring; adhesions at that point. Ligation of appendix. Recovery.

67. Pollosson (Lyon med., 1893, lxxiii, 75) reports the case of a woman of 71 years, in a condition of cachexia and delirium. No history was available. In the right iliac fossa above Poupart's ligament was a fluctuating mass, which could be traced down the thigh into the triangle of Scarpa, in front of the femoral vessels. An incision was made above Poupart's ligament. The patient died a few days afterward. The autopsy revealed a purulent collection situated within the peritoneum above Poupart's ligament and a counter opening made on the thigh. Fetid pus was evacuated. It was limited by adhesions to a point about the cæcum and the appendix. The latter was gangrenous and perforated. The purulent collection was traceable into the triangle of Scarpa, and was surrounded by a peritoneal diverticulum forming a sac for a crural hernia.

68. Ibid. In a second case, the patient was a woman 37 years old, who had had a small tumor in the crural region for five years, but had never worn a truss. During the last two days, without any effort on her part, the tumor had become larger and painful. She had had colic and vomiting. During the last twenty-four hours she had not been able to pass either gas or stool. A diagnosis of strangulated hernia was made, and an operation performed. The patient was anæsthetized, and the operation was conducted as for an ordinary hernia. The sac was incised. It contained an abundance of reddish liquid; but in the interior, instead of intestine or omentum, there was found a reddish cord, 5 cm. long, and of the thickness of the little finger. The neck of the hernia was cut through, and the strangulated portion pulled out. It was found to be the appendix. This was resected, and the patient recovered. A distinct ring of strangulation could be seen below the colon.

69. In a third case, the patient was a woman of 32 years, who had had a right femoral hernia for two years. She had had strangulation once before but recovered. Since that time she had worn a truss. For the last eight days, the hernia had been down, painful, and gradually increasing in size. There was some nausea and constipation. A diagnosis of strangulation was made, and an operation performed. The sac was dissected out and opened, and serous fluid escaped. Within the sac was to be found a small, hard tumor, the size of a terminal phalanx. This was reddish, and was found to be the appendix. The strangulated portion of it was resected and a radical operation was performed. The patient recovered.

70. Puchelt (quoted by Merling; Diss. Heidelberg, 1836; L'Experience, 1837, i, 337) reports the case of a woman of thirty years of age, with a right femoral hernia that had never before given her trouble. Suddenly, and without external cause, the hernia became strangulated. There was slight pain on mere touch, some vomiting, and fecal retention. An operation was performed, and the vermiform appendix slipped back in the abdomen spontaneously. Patient recovered.

71. Quenu (Bull. et Mem. d. l. Soc. de Chir., 1903, xxix, 801). Woman, aged 42; right-sided irreducible femoral hernia for nine days; pain, swelling; no vomiting; no obstruction; fluctuation. Hernial sac contained appendix, which was congested and red and strangulated about its centre.

72. Riese (Deut. med. Woch., 1900, xxvi, 259 v.) reports the case of a woman of 51, who for several years had had a right-sided femoral hernia, easily reducible. While lifting a heavy kettle, the hernia came down, and with this was noticeable a drawing sensation of the navel. The mass became larger and the patient had nausea and belching. When she entered the hospital she had had no movement for 24 hours. In the right femoral region there was a tense mass. The abdomen was distended and tympanitic. The skin over the mass was red. An incision was made, and the hernial sac was opened. A turbid fluid ran off, and in the sac was a bluish-black mass, the size of a thumb, which was recognized to be the appendix. It was not adherent to the hernial sac. It was impossible to reduce the appendix, because of the thickness of its mesentery. The abdominal muscles were split for a short distance. The process was then reduced and amputated, and the patient recovered. The appendix showed a furrow 3 cm. below its base, being bluish-black on the other side. The mesentery was swollen. The author believes that during the effort made the appendix entered the sac and became incarcerated.

73. Romm (Deut. Zeit. f. Chir. 1895, xli, p. 249). Man, 48 years of age; had a small reducible swelling in the left groin. Four days ago it became irreducible and painful. The overlying skin was red and œdematous. There was no vomiting or other obstructive symptoms. At operation a small amount of foul pus was found in a gangrenous hernial sac. The appendix was also in the sac in a gangrenous condition. It contained a small fecal concretion. The appendix was removed. The presence of the appendix on the left side was due to a long mesocolon, and the mobility of the appendix. The patient recovered.

74. Rose (Deut. Zeit. f. Chir., 1892, xxxv, 51) reports the case of a woman of 54, that had had a femoral hernia the size of a hazel-nut, which, however, gave her no trouble. She wore no truss. Suddenly she developed pain in the hernial sac and began to vomit. She traced this condition to the lifting of a heavy tub. During the next two days she vomited from three to four times a day. The pains became more violent and colicky, and both stools and flatus ceased to pass. The hernia was on the right side. It was tense and tender. Fifty-five hours after the beginning of incarceration an operation was performed. The hernial contents were found to consist of a blackish-red piece of intestine no greater than the size of a pea. It was firmly incarcerated. The operation was very difficult. Upon closer examination, it was found that the incarcerated portion of bowel was a part of an appendix that was itself five inches long. The non-incarcerated portion was very pale; the incarcerated, blackish-red, and probably twice as large as the other part. The patient recovered. The appendix was not removed.

75. Rotter (über Peritiphlitis, 1896, p. 57) reports the following three cases:

The first patient was a woman of 68 years, who had had an irreducible hernia the size of a hazel-nut for four years. It was occasionally painful. Five days before operation, she had experienced violent pain over the hernia, which became larger, and finally grew to be as large as a hen's egg. There was no vomiting. The bowels were moved regularly. The hernial sac was opened and brownish hernial fluid was discovered. The remaining contents consisted of a dark red node, the size of a hazel-nut, entering through the crural ring. There was a tight constriction. The incision was elongated, Poupart's ligament was divided, and the incarcerated portion of bowel was found to be a knee-shaped part of the vermiform appendix. The tip lay free in the abdominal cavity. The appendix contained pus, but there was no perforation. The cæcum was adherent to the apex of the appendix. The appendix was resected, and distinct constriction was found. The patient recovered.

76. The second case was in the person of a woman of 25 years, who did not know that she had a hernia; suddenly became nauseated, vomited, and had violent pelvic pain. The next day there appeared in the upper part of the thigh a mass the size of a pigeon's egg. It was painful. The bowels were moved regularly, and there was no sign of incarceration. The opening of the hernial sac revealed pus and an appendix that was bent on itself. It was dark-brown, its serous coat was smooth, and there was no perforation. Poupart's ligament was severed, the appendix was removed, and the patient recovered.

77. The third patient was a woman of 60 years, who, shortly after slipping, felt violent pain in the right femoral region. She had never had a hernia before, but she then noticed a distinct swelling. This was followed by vomiting, and the pain continued. The mass grew to be the size of a pigeon's egg. The skin was inflamed, but there were no signs of incarceration. At the operation the hernial sac was made free; Poupart's ligament cut through, and the abdominal cavity opened. The hernial mass had a central constriction, this being due to Poupart's ligament. Within the hernial sac was found some darkly discolored intestine, reaching into the abdominal cavity. This was discovered to be the gangrenous appendix. There was no perforation. The appendix was removed, and the patient recovered.

78. Sauvage (Thèse de Paris, 1893) reports the case of a woman with a strangulated right femoral hernia. Its contents were found to be the vermiform appendix, which was reduced after dilating the hernial orifice. The patient recovered.

79. Schede (Deut. med. Woch., 1893, xix, 451) reports the case of a woman of 60 years, with a right-sided femoral hernia. Herniotomy was performed. The hernia contained a gangrenous appendix, which was resected. The hernial sac was sutured, and the patient recovered.

80. Shands (Annals of Surgery, September, 1904) reports the case of a woman 29 years of age, who first noticed a swelling in her right groin in 1899. It developed very gradually, gave no pain or inconvenience,

and always disappeared when the patient assumed the recumbent position. In October, 1903, the lump increased rapidly in size, became very painful on pressure, and did not disappear on lying down. There were no symptoms of strangulation of the bowel. A diagnosis of incarcerated femoral hernia was made, and an operation performed on November 3. Upon opening the sac there was a gush of peritoneal fluid; there was neither intestine nor omentum in the sac, but firmly adherent on the side was the appendix ceci, with the distal end ulcerated and much enlarged. The appendix was amputated in the usual way, and the wound closed as for a radical cure for femoral hernia. The patient made an excellent recovery.

81. SONNENBURG (Deut. Zeit. f. Chir., 1894, 38, 269) reports the case of a woman of 65 years, who had never had a rupture until eight days before operation. While lifting a weight, she had suddenly experienced pain in the right groin, which became swollen and painful. She had had no bowel movement for four days; there had been no vomiting. The patient was very fat. The swelling in the groin was tender to pressure and infiltrated. At operation, pus with a fecal odor was evacuated. The pus-cavity continued upward into a long channel, which corresponded to the crural canal. The patient improved. The pus was plentiful and always had a feculent odor. The pus cavity contained a long cord, dark-gray, with a narrow lumen. This was evidently the vermiform process. After this cord was cast off the secretion became less and the fecal odor disappeared. The patient died some years later, and the autopsy showed the vermiform process to be only 3 cm. long, its free end being adherent to the peritoneum. This showed that a portion of the appendix must have been cast off, after the opening of the hernia. The portion cast off was 8 cm. long. The hernial sac closed within four weeks. The case was evidently one of acquired (not congenital) incarcerated, gangrenous, pure hernia of the vermiform appendix.

82. IBID (Path. u. Therap. d. Peritiphlitis, 1900, p. 184). The second case was that of a woman of 74 years, who had had a hernia on the right side of the thigh for two years. It had gradually become larger, and during the last two weeks had been irreducible. There was vomiting, but no fecal obstruction; and violent pain in the lower part of the abdomen was felt. The mass was the size of a goose-egg; the skin over it was infiltrated and inflamed. Fluctuation was present. As soon as the skin was incised, pus with the odor of fæces and containing gas poured out. The hernial sac was found to be thickened and gangrenous, and within it was the black appendix, which was perforated. This was resected, and the patient recovered.

83. SPANTON (British Med. Journal, 1889, p. 126). Single woman, aged 62 ears; in October, 1888, had a painful abscess in right groin. Two years before, while carrying a basket, felt something give way in the right groin. It caused pain and a small swelling soon developed, but caused only slight inconvenience. No further notice was taken of the swelling.

August, 1888, surface of swelling became red and inflamed, and skin shortly after broke down, followed by discharge of thin, dark pus.

At examination, erysipelatous blush over upper part of thigh; two sinuses; dirty looking discharge.

Operation: Carefully proceeding, some enlarged glands were removed and appendix exposed; the latter had come down behind the peritoneum; it had no peritoneal covering,—*i.e.*, a retroperitoneal hernia of the appendix. The patient recovered.

84. SPURRIER and CORNER (St. Thomas's Hospital Reports, N. S., Vol. xxxi, 371) relate the following case:

Woman, aged 70 years; one week before coming to the hospital had a bilious attack, accompanied with retching and straining, which caused the appearance of a lump in the right groin. This lump caused very little inconvenience at first, but it gradually increased in size and gave rise to great pain. The patient was well otherwise, and the bowels acted regularly. The diagnosis of stangulated epiplocele was made.

When the sac was opened, it was found to contain the distal inch of the appendix. Gimbernat's ligament was incised, the appendix brought down, amputated, and the stump invaginated with cæcum. Prompt healing followed. The specimen showed a well-marked ring dividing the injured from the healthy parts. The distal portion was blackish-brown, with thickened œdematous walls.

The authors make the following comment: As there was no pain at the time of the formation of the hernia, and not for some hours after, it seems improbable that the appendix was strangulated at once. Again, at the operation the appendix was easily pulled down, though it was swollen far too big to be returned to the abdomen without a "herniotomy." Consequently it seems reasonable to assume that the apparent strangulation was the result and not the cause of the appendicitis.

85. STAATSMAN (Münch. med. Woch., 1904, li, 603) reports the case of a woman of 42 years, who had never noticed that she had a hernia until five days previously, when, without special cause, she had developed sudden pain in the right femoral region. She continued to work; and the next day she noticed a tumor, which gradually increased. There was violent pain in the region of the navel, and the mass could not be reduced. The tumor was the size of a walnut, hard, and elastic. The skin was not reddened. The region was painful to pressure. At operation the lymphatic glands were removed and the hernial sac opened. Within the sac was found a greenish discolored piece of intestine, folded on itself. It passed through the femoral canal, and was found to be the appendix, already gangrenous. Drainage was inserted and the treatment with opium continued. The appendix gradually broke down and sloughed off, and the patient recovered.

86. The second case was that of a woman of 74 years, who had never known that she had a hernia until she had suddenly developed a painful tumor in the right groin three days previously, while carrying a heavy weight. It gradually enlarged, but there was no vomiting, and the bowels

were regular; the tumor became more painful. A diagnosis of incarcerated light femoral hernia was made. At operation there was found lying in the femoral canal the incarcerated appendix. There was no hernial fluid. The femoral ring was divided, and the appendix resected. The patient recovered. The appendix was 5½ cm. long.

87. SWASEY (Med. Record, N. Y., 1881, p. 706). Woman, aged 67 years, spare; while lifting, six years before, felt a peculiar sensation in right Scarpa's space; and later, while bathing, found a compressible tumor, size of a walnut, at saphenous opening. Has worn a truss, but hernia never completely reduced.

January 28, tumor size of hen's egg, painful and irreducible; some abdominal pain and nausea. This sudden trouble followed heavy lift. Operation thirty-six hours after: Sac exposed and clear fluid seen. This was withdrawn by hypodermic needle, and appendix could be seen and felt within sac. It was returned to abdomen by manipulation. Sac not opened. Patient recovered.

88. TACKE (Beiträge z. klin. Chir., 1901, xxix, 72) reports the case of a woman of 54 years, who developed pain in the lower part of the abdomen very suddenly. This pain gradually increased, and a mass developed below Poupart's ligament on the right side. It turned out to be a hernia, which could not be replaced. There was constant nausea, but no vomiting. The mass was about half the size of a hen's egg, and somewhat painful. It could be traced upward above Poupart's ligament into the abdominal cavity, where it was more tender than further down. An operation was performed on the third day. The hernial sac was found to be the size of a small walnut, and, when opened, was found to contain a grayish tumor of considerable length, which closed the hernial neck completely and continued upward into the tumor of the abdomen. A large opening of the peritoneum was made. The tumor was found to be the vermiform appendix with a swollen mesentery. It was but 10 cm. long. The peritoneum was inflamed. The peripheral end of the vermiform appendix was bent on itself and above the bend a black discolored constriction-ring was found. The lower part was necrotic. The appendix was ligated and the patient recovered.

89. TAPIE (Arch. provinciales de Chir., 904, xiii, 479) reports the case of a woman of 67 years, who had had a strangulated right-sided femoral hernia fifteen years before. At the time of its first appearance, she was operated upon, and some intestines were found in the hernia. This was reduced and the hernial sac was closed. Six years later the hernia recurred; but, as it was easily reducible, she wore a truss. During the last two years the truss was not worn, and the hernia soon became irreducible. It had been gradually increasing in volume. Suddenly it became very painful, and colicky attacks occurred. The patient began to vomit and was soon in the state associated with intestinal obstruction. Examination showed a hernial tumor, very hard, painful, and tender. It was irreducible. An incision over the crural arch was made, and the adhesions were dissected. An incision was made into the hernial sac,

in which was seen a strangulated cylindroid mass. This was found to be the appendix. It was from 12 to 15 cm. long, and very much swollen. The constriction-ring was liberated and the appendix reduced. The patient recovered.

90. TILANUS (Nederl. Tigdschr. f. Geneeskunde, 1855, Sept.) reports the case of a woman of 65 years, with a tumor of the right thigh, which had been present for nine days. The cause was unknown. The mass gradually increased in size; it was painful, and walking was almost impossible. There was constipation, but no nausea or vomiting, and no abdominal pain. The skin was red and tense. The right labium was hard, and fluctuation was present. An incision revealed a gelatinous exudate. Beneath this was a cavity containing foul pus and fibrin. In the femoral canal was found a piece of intestine 2½ inches long, with the blind end dark blue. It was not perforated and was filled with gas. The femoral ring was incised and the constriction was overcome, but the hernia was not reduced. Exudate was found within the labium. Drainage was inserted. The piece of intestine was found to be the appendix. Peritonitis subsequently developed and the patient died. Half an inch of the appendix was found still within the abdominal cavity, and the cæcum was gangrenous.

91. The second case was that of a woman of advanced age, with a femoral hernia containing the appendix. The patient died of general peritonitis.

92. THOREN (Hygiea, 1887, p. 762) reports a case of incarceration of a vermiform appendix in a femoral hernia. The patient recovered after herniotomy.

93. CARREZ (Lyon med., 1900, xciv, 493) reports the case of a woman, 70 years of age, who had an easily reducible right femoral hernia. She was seized with sudden pain during sleep, when the hernia was found to be hard, painful, and irreducible. There was bilious vomiting.

At operation the sac was found to contain the appendix which was strangulated in the crural ring. The tip was gangrenous, the base was normal.

94. VULLIET (Revue Médicale de la Suisse Romande, 1900, vol. xx, p. 336). Woman, 54 years of age; hernia for fourteen years. She had never worn a truss as the hernia did not cause any inconvenience, and was always easily reducible. One month ago, for the second time recently, violent abdominal pains were felt, the hernia became irreducible and increased in size. There was some nausea but no vomiting; tongue dry, bowels regular. The lump was aspirated and a glass and a-half of clear fluid withdrawn, after which the hernia was reduced. Three weeks later there was a relapse, the same symptoms being repeated. Diagnosis: Strangulated omental crural hernia. Under local anæsthesia the sac was opened; a large quantity of yellowish fluid escaped. The hernial sac was hemorrhagic. The appendix, rigid and turgid, was seen projecting from the crural canal. It was incarcerated, but was reduced after

the ring had been dilated. The sac was resected and radical cure performed. The patient recovered.

95. WARING and ECCLES (St. Bartholomew's Hospital Reports, vol. 27, 1891, page 179). Woman, aged 46 years; first observed a right femoral hernia in 1879. It was easily reducible. She never wore a truss. Confined in 1887. Swelling did not reappear until January, 1890, when it was irreducible and painful. Replaced by a doctor, and truss worn since. In usual health until evening of January 18, 1891, at 7 o'clock. Had severe griping pains, loose motions, and passed flatus by mouth. Later vomiting. Next day taxis under chloroform; unsuccessful. Operated: Sac contained only appendix. Stricture divided; appendix pulled down, and ulceration and perforation at site of constriction. Appendix ligated with silk above, and cut away. The patient recovered.

96. WETTE (Inaug. Diss. 1889, Aachen; quoted by Bajardi; also by Brieger; Arch. f. klin. Chir., 1893, xlv, 892) reports the case of a woman of 87 years, with a right incarcerated femoral hernia. Herniotomy was done. The sac contained clear liquid, and an appendix with a relatively long mesentery. The appendix was reduced and radical operation was performed. The patient recovered.

97. WÖLFER (Arch. f. klin. Chir., vol. xxi. p. 432). Man, aged 19 years; appendix strangulated in right femoral hernia; constipation, nausea and vomiting. Herniotomy. The adherent appendix was left in the sac. The patient recovered.

98. ALFRED C. WOOD. (Author's case.) In the summer of 1900, a woman about 70 years of age was admitted to St. Agnes's Hospital at the request of her physician on account of what was thought to be a suppurating right inguinal bubo.

Upon examination a swelling about as large as an egg was found beneath Poupart's ligament on the right side. It was somewhat irregular in outline, painful on pressure and soft to the touch. The surface was of a dark red, almost livid color. According to the history, the swelling developed suddenly, ten days to two weeks before, without any cause that could be assigned. If a hernia existed previously it had not been observed. The temperature was between 101° and 102° and the pulse correspondingly accelerated. The tongue was furred and dry. The whole picture resembled quite accurately a late stage of suppuration of the vertical chain of inguinal lymph-nodes, although no lesion was found on the foot or leg to account for such a condition. The very soft character of the swelling noted was accounted for by the fact that hot flaxseed poultices had been applied for several days.

When the skin was divided a necrotic mass was exposed in which there was but very little fluid, and that was turbid and watery rather than purulent. After the necrotic structures had been removed as far as possible, the appendix was found in the bottom of the wound, the distal half being gangrenous. After cleansing the cavity the incision was extended upward until the base of the appendix was exposed. The tissues being healthy at this point a ligature was applied and the diseased part was removed. The incision was only partially closed by sutures, free drainage being provided, as there was great probability of peritonitis following. The wound did not do well; the inflammation, which was already present, spread, and took on an erysipelatous character. The patient's tongue became more dry and coated, the bowels moved only with the greatest difficulty, the temperature and pulse gradually rose, and the patient died about a week after the operation, from sepsis.

99. (Author's second case.) Mrs. B., aged 65 years, was seen by the writer in consultation with Drs. Bellows and Reckefus, August 10, 1904, on account of a lump in the right groin. Her attention was first drawn to this condition after retiring on the evening of July 19, 1904, during a stay at the seaside. She discovered, quite by accident, during full extension of her thigh, a lump about the size of an egg, in the right groin. There was a very slight diffused pain about the front of the thigh, but otherwise no inconvenience was felt. On the following morning she consulted a physician, who told her the swelling was a femoral hernia. Nothing was done for the condition until she returned to her home on 3rd of August, when she called upon her family physicians, who arranged for the consultation, which was held on the date mentioned.

Upon examination, a swelling about as large as half an orange was observed in the right groin, below the inner half of Poupart's ligament. It was almost painless, presented an elastic sensation to the touch and gave a flat note on percussion. There was an indistinct suspicion of an impulse on coughing. The mass could not be reduced. It was the unanimous opinion that the condition was an irreducible femoral hernia. That the sac did not contain intestine was evident by the entire absence of obstructive symptoms, as well as the dull note on percussion. It was, there-

fore, supposed that the hernia consisted of omentum,—an incarcerated femoral epiplocele.

About two years ago the patient had an illness which was thought to be "grip." Since this time she had not been well. She was unable to exercise as usual on account of feeling weak and short of breath, although previously strong, and still of robust appearance.

In the general physical survey, the condition of the heart at once attracted attention. The action was very irregular; some beats were very feeble and imperfect, while others were loud and tumultuous. The rhythm was entirely upset, the intervals between the impulses varying greatly. The pulse could not be counted at the wrist, as only the stronger contractions of the heart were registered, nor could the heart-beats be definitely counted by auscultation over the precordia, owing to the extreme irregularity spoken of, but as nearly as could be estimated they were about 120 per minute.

The urine was scanty in amount, but otherwise normal. The other organs appeared sound.

An operation was advised in spite of the condition of the heart, as it was manifestly unsafe to permit an irreducible hernia to remain in that condition, even if composed of omentum only. The patient entered the University Hospital August 15. There had been no change noted in the meantime.

The operation was performed on the following day, the patient having been prepared in the usual manner. As the chief cause of anxiety was the anæsthetic, specific instructions were given as to the administration of the ether, and arrangements were made in advance to carry out each step of the operation with the least possible delay in order to shorten the time of operation.

A vertical incision, three inches in length, was made over the swelling and the mass fully isolated. The sac was thickened and opaque and under such extreme tension that it was impossible to distinguish the nature of its contents. It was therefore carefully opened, when a considerable quantity, estimated at between two and three ounces, of slightly turbid straw-colored fluid was forcibly discharged. The sac then seemed to be empty, but on enlarging the opening and inspecting its interior the vermiform appendix was observed protruding from the neck of the sac,

probably one-half of its length being external to the latter. There was not a trace of omentum or other structure in the sac. The appendix appeared perfectly normal in color, but was slightly swollen and œdematous. It did not show any evidences of acute inflammatory change, but either from constriction or adhesions, was held firmly in its new position. The problem of the proper disposition of the appendix at once came up. Its removal would have necessitated extending the original incision into the abdominal cavity, or the making of a second incision at the usual site for reaching the appendix. Both of these procedures were highly objectionable on account of the patient's physical condition, already referred to. On the other hand was the appendix so damaged that its return to the abdomen would subject the patient to the risk of peritonitis, or the inconvenience of a second operation ? While this problem was being weighed and discussed, the appendix which was held by the constriction of the neck of the sac, and also by the adhesions, was being liberated by the finger. A final examination of the process led me to decide to accept what I considered to be the remote risks mentioned, rather than prolong the anæsthesia and thus add to the danger of the present operation, an opinion which was shared by both of the patient's physicians. The appendix having been returned, the sac of the hernia was ligated as high as possible and excised. The operation was concluded by performing a radical cure according to Bassini's method.

The patient made a satisfactory recovery in every particular, the wound healing by primary union, and the general condition was quite as good as before the operation. She was discharged from the hospital on the 3rd of September. The patient has constantly improved in health since leaving the Hospital.

100. WULFF (Deut. med. Woch., 1901, xxvii, 175, v) reports the case of a woman who had had an easily reducible femoral hernia for a year. Four days before admission, while bending forward, she suddenly experienced violent pain in the region of the hernia. Two days after this, there was nausea and the hernia could not be replaced. At the time of admission, she showed a rounded mass below Poupart's ligament, covered with normal skin, and somewhat tender. There was a slight rise of temperature; no peritoneal irritation; but a slight drawing at the umbilicus. Operation showed the hernial sac to contain a clear, slightly bloody fluid, in which was the hemorrhagic free appendix. Its mesentery

was rich in fat, and discolored. At the hernial ring there was a distinct furrow; and on the other side of it the appendix was perfectly normal. Resection of the process and closure of the wound were followed by the recovery of the patient. The appendix was 12 cm. long. There was no pus, fecal mass, or mucus in its lumen; and no stenosis. The appendix was not gangrenous below the constriction, even though there was a hemorrhagic infarct. The condition was due to a pure incarceration.

OBTURATOR APPENDICULAR HERNIA.

Although the subject of obturator appendicular hernia is foreign to this paper, I have included the report of a single example. It is introduced here because it is nearly or quite unique, none of the writers quoted having mentioned the subject except Spurrier and Corner, but their collection did not include any illustration.

The case is described by Bary (Dissertation, Greifswald, 1893) and is as follows:

A woman, 42 years of age, had a painful mass in the region of the pectineus and adductor muscles. It gradually became larger and fluctuating. Operation was refused and the patient died. At the autopsy, an abscess was found beneath the pectineus and between the adductor muscles. The pelvic cavity behind the obturator foramen was filled with pus. The foramen was sufficiently open to permit the index-finger to pass through. Within it and adherent to it lay the perforated apex of an appendix four and a-half inches long. There were no symptoms of incarceration. The peritoneum was free from signs of inflammation.

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INGUINO-PROPERITONEAL HERNIA; INGUINO-INTERSTITIAL HERNIA.

REPORT OF CASES WITH REMARKS.[1]

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CASE I.—*Strangulated Inguino-properitoneal Hernia; Reduction en masse; Herniotomy; Recovery.*—F. M., male; aged 52; admitted to the St. Luke's Hospital January 18, 1904. History: The patient has had a right inguinal hernia for six years past. He first noticed it after lifting a heavy timber. It has gradually grown until at the present time it is larger than two fists. Shortly after its development he had a truss fitted by his family physician, which has been quite satisfactory. It has retained the hernia excepting when he was obliged to lift unusual weights. At these times when the hernia came down he could by manipulation effect its reduction without difficulty. Two days ago the hernia slipped by the truss while he was loading wood upon a sleigh and was allowed to remain down about an hour before an attempt was made to replace it. When an effort was made to reduce the hernia it failed. The pain was moderately severe, but not sufficient to prevent his finishing his day's work. After returning home in the evening, another unsuccessful attempt was made to reduce the hernia. The pain had now become quite severe and was accompanied by nausea. About 10 o'clock at night he vomited once. After this he became alarmed and sent for his family physician, who administered a hypodermic of morphine and applied hot fomentations to the hernia. After an hour the hernia was reduced. At the time he noticed that the swelling did not disappear suddenly as it had on former occasions when the gut slipped back into the abdomen. The pain was lessened but did not subside completely. The large tumor had

[1] Read before the Chicago Surgical Society, January 5, 1906.

disappeared, but he could still feel a small mass in the inguinal region which was exceedingly sensitive to touch. The nausea continued all through the night, but he did not vomit again. There was no bowel movement after the hernia came down, neither did any gas escape. The following morning the symptoms remaining the same he was brought to the hospital.

Physical Examination on admission to the hospital showed the heart and lungs negative. The pulse was slightly accelerated and the temperature was 99° F. The abdomen was moderately distended, but not tender. There was no marked rigidity of the abdominal muscles. Over the middle third of Poupart's ligament on the right side there was a tumor about the size of an English walnut, rather firm, immovable, and tender on pressure. The inguinal canal was empty, admitting the index-finger freely. With the finger in the inguinal canal, the tumor could be felt above and to the inner side of the internal abdominal ring, in the abdominal wall. The scrotum contained the testicles, which were normal in size and appearance.

The subjective symptoms were about as they had been since the accident occurred. There was some pain in the inguinal regions, which he claims is as intense as it was immediately after the hernia was reduced. The bowels have not moved and no gas has been passed. With these symptoms continuing, an operation was advised, it being considered probable that a complete reduction had not been accomplished. The existence of a properitoneal sac was not recognized.

After the usual preparation, the operation for herniotomy was begun. After exposing the external abdominal ring a sac was found extending from the ring down into the scrotum. This was freed from its attachments up to the external ring. The inguinal canal was opened by incising the aponeurosis of the external oblique. After freeing the inguinal sac up to the internal ring it was opened, and from it escaped a small quantity of bloody serum. On pulling down on the inguinal sac, the neck of a second sac was brought into view. This sac was opened by extending the incision made in the first sac. It was seen to contain a small knuckle of the small intestine and a piece of omentum. The omentum was dark in color and œdematous. It was freed from the sac, drawn out beyond its point of constric-

tion, ligated and cut off. The stump was pushed back into the abdomen. With the replacement of the omentum, the knuckle of gut was freed and dropped back into the abdominal cavity. The second sac was now dissected from its attachments and found to occupy a cavity between the peritoneum and the transversalis fascia. The cavity containing it was above and to the inner side of the inguinal canal. After pulling out the sac from its place in the abdominal wall, it was found to open by a common orifice with the first sac into the abdominal cavity. This orifice, which would barely admit the index-finger, was constricted and surrounded by a dense band of fibrous tissue. In size, the deep sac was not as great in circumference and only about one-third the length of the inguinal sac. It admitted freely the thumb up to the base of the first phalanx.

After carefully studying the relations of the two sacs to each other and to the abdominal wall, the common orifice was enlarged to admit two fingers into the abdominal cavity. The strangulated loop of gut was searched for and brought into the opening. The part constricted was found to be a portion of the convex border of the gut opposite the mesentery; only a segment of the circumference of the gut was strangulated. Although the intestinal wall was discolored, yet the circulation seemed to be undisturbed and its surface still showed its normal gloss. It was deemed safe to replace it in the abdomen. The two sacs were then pulled forward until a funnel-shaped process of peritoneum, their common neck, was brought into view. This was incised beyond the abdominal orifice of the sacs and the resulting opening in the peritoneum closed by suture. The operation for the radical cure of the hernia was completed, Andrew's modification of the Bassini method being employed.

The wound healed by primary union; recovery with cure of the hernia resulted. The patient was discharged February 6, 1904.

The term "inguino-properitoneal" hernia is reserved for those which fulfil the following conditions: (1) There must be two sacs or two divisions of one sac. (2) The inner or intraparietal sac lies between the peritoneum and the transversalis fascia. (3) The outer or inguinal sac occupies the

inguinal canal or extends down into the scrotum for a variable distance depending upon the degree of completeness attained by the hernia. (4) The origin of the two sacs is by a common funnel-like process. They open into the abdominal cavity by a common orifice.

Although Parise [1] first described this variety of hernia, it was Krönlein [2] who first gave it the name of properitoneal hernia, and described fully its anatomical and clinical peculiarities. Since Krönlein's work appeared, a large number of cases have been reported with but few new facts added to what he had observed. In 1895 Breiter [3] was able to find the reports of 36 cases of which no question could be raised as to their place in this group. These, added to Krönlein's 23 cases, made 59, that had been reported up to that year. The works of Krönlein and Breiter have been supplemented by papers from Faghet [4] in France, Moynihan [5] in England, and Schmidt [6] in Germany.

Etiology.—It has been observed that properitoneal hernia is frequently associated with imperfect descent or development of the testicles. Many writers assume from this the existence of a causal relation between the arrest of descent of the testicle and the formation of a properitoneal sac. Undoubtedly, given a case in which the ectopic testicle is placed in the inguinal canal or just below the external ring, associated with a congenital hernia, that, impulses from above continuing while the descent of the gut in the inguinal sac is impeded by the misplaced testicle, the gut will be forced laterally in the direction of the least resistance, which may be the cause of a diverticulum of the sac being forced into the loose cellular tissue between the peritoneum and the transversalis fascia. On the other hand it is well known that many cases of properitoneal hernia have been reported in males in which the testicles, fully developed, have reached their normal position in the scrotum. In a few cases reported, this variety of hernia has been found in the female. Eccles claims that, taking all the reported cases, they are relatively more common in the female than in the male sex.

Considering further the etiology of properitoneal hernia, we may have the return of the bowel from the inguinal sac impeded by a cicatricial narrowing of the neck of the inguinal sac, thus causing a bulging of the neck of the sac between the layers of the abdominal wall.

Repeated and unrestrained efforts at reduction of a hernia made by the patient may be a cause of the development of the properitoneal sac which is secondary to an existing inguinal sac. Obstruction of the inguinal canal other than from a misplaced testicle may assist in forming a second sac. This may be from a congenitally small external ring with an unusually large canal. Cicatricial narrowing of the external ring resulting from a trauma, or the pressure of a misfitted truss which closes the external ring and not the canal, may be factors in establishing a secondary properitoneal sac. Eppinger believes them to be all congenital, the inner sac developing from a diverticulum of the funicular process between its point of origin and the internal ring, which is usually constricted. Schmidt accounts for the internal sac by assuming the existence of a dislocated internal ring. As a result of this dislocation, the normal descent of the testicle is interfered with and an inner sac is formed from the upper portion of the inguinal process. Congenital diverticular pouches located about the inner ring as first observed by Rokitansky may constitute a starting-point for the formation of a properitoneal sac. Moynihan has observed them in adults, but more often in the fetus.

Reduction *en masse* has been considered as a cause of properitoneal hernia. The phenomenon known as mass reduction has been frequently observed in those hernias in which a bilocular sac existed. It is probable that in a large proportion of cases in which this accident has occurred, there existed previous to the reduction a second sac into which the contents of the inguinal sac had been frequently forced. Strangulation after one of these apparent reductions continues from constriction of the common abdominal orifice of the two sacs.

At the operation or at the autopsy the presence of a properitoneal sac may be first discovered. The generally-accepted explanation of the so-called reduction *en masse* is that an inguinal or crural sac, by repeated and forcible manipulation, is separated from its attachments to the surrounding structures and invaginated, or is pushed into the abdominal cavity without the relations existing between the sac and its contents being changed by the change in position of the sac. It may be here stated that such a separation of the sac, particularly of a congenital hernia, would seem impossible. The difficulty mentioned in separating an acquired hernial sac from its attachments in herniotomy, which in most operations is considerable, would seem to preclude the possibility of this occurring from taxis applied through the intact coverings of a hernia. Strubel [7] believes this usual explanation of reduction *en masse* of a hernia to be unsupported by autopsy, and considers that it occurs only in bilocular hernia of some variety. Other accidents that may simulate reduction *en masse,* but which cannot be strictly so considered, are rupture of the sac with the escape of the hernia into a pocket in the abdominal wall, or rupture of a sac containing a large quantity of hernial fluid with the escape of the fluid into the abdominal cavity or between the muscles of the abdominal wall, the gut or omentum remaining strangulated. This occurring in a fat patient where the wall is thick and hernia small, the presence of a strangulated piece of intestine in sac might be overlooked. The diminution in size of the tumor might be considered evidence of complete reduction of the hernia.

In summing up the factors that appear to us as being the most important in the causation of properitoneal hernia, and also of the other forms of interstitial hernia, we may mention that there appears to be good reason to believe that congenital defects such as incomplete descent of the testicle, congenitally misplaced internal abdominal ring, unusual narrowing of the external ring, or congenital diverticular-like process of the peritoneum about the internal ring, may deter-

mine the development of a secondary interstitial sac, the inguinal sac being primary in time of development. It has been shown that bilocular hernia occurs more frequently on the right side than on the left (33 in right and 20 in the left in 59 cases collected by Breiter). It is also well known that ectopic testes occur oftener in the right side, and that the funicular process closes later on the right than on the left side. These facts indicate that some relation may exist between these congenital defects and the occurrence of a properitoneal hernia. However, the existence of this variety of hernia without the congenital defects mentioned above indicates that the other etiologic factors detailed may occasionally determine the development of a second sac. The chief we believe to be the use of a poorly fitted truss.

Relation of the Properitoneal Sac to the Internal Ring.—The inner or properitoneal sac generally occupies one of three positions: (1) Between the internal ring and the anterior superior iliac spine, its long axis being directed upwards and outwards parallel with Poupart's ligament. This is the usual position and easiest recognized before the sac is exposed either by operation or autopsy. (2) It may be directed downwards and inwards to the side of or in front of the bladder. This form has been described as hernia inguinalis ante-vesicalis. (3) It may be directed backwards and occupy the inner part of the iliac fossa. In this variety the inner sac lies close to the retroperitoneal pouches that are known as the subcæcal fossæ. Moynihan believes that certain cases described as hernia into the retrocæcal fossæ have in reality been properitoneal hernia belonging to this third group. U. Schmidt[8] describes an inguinal-properitoneal hernia in which the properitoneal sac extended from the internal ring to the obturator foramen, occupying a part of the true pelvic cavity. The patient had what was considered a common left inguinal hernia that had existed for several years. Twice it had become strangulated. The first time reduction, which was easily made without an anæsthetic, was complete. A few months later it again became

irreducible and painful. An attempt at reduction was made and considered successful. The symptoms of strangulation continued. Operation upon the second day after the apparent reduction showed the inguinal sac to contain only about 30 c.c. of bloody fluid. As the cause of the persisting symptoms of strangulation could not be discovered through the herniotomy wound the abdomen was opened in the median line. With the patient in the Trendelenburg position a careful search revealed the properitoneal sac deep in the pelvis. An opening connecting with the inguinal sac that just admitted the index-finger was located. The strangulation occurred at the neck of the properitoneal sac.

The size of the properitoneal sac is usually small, and in this respect bears no relation to the inguinal sac. Many of the reported cases were described as Littre's hernia, the properitoneal sac containing only a small diverticular-like segment of the circumference of the gut. This was the condition found in our case.

The inguinal sac may occupy any part of the inguinal canal or extend into the scrotum. It is frequently congenital, and at times double. In itself it differs in no particular from the sac of an ordinary inguinal hernia. The common abdominal orifice of the two sacs is frequently contracted. Its margin may be rigid from the presence of cicatricial tissue, due no doubt to repeated traumatism from the forcible reduction of the hernia.

The diagnosis of Properitoneal Hernia is seldom made excepting when the properitoneal sac is exposed to view during an operation or at the autopsy. Braun [9] reported what he believed to be the first case in which the presence of a properitoneal sac was recognized and the exact anatomic condition detailed before the patient was operated upon for the relief of the strangulation which existed.

The usual history of these cases is that a patient with an inguinal or femoral hernia which has been hitherto reducible, suddenly develops symptoms of subacute or acute stran-

gulation. Reduction by taxis is attempted and followed by apparent success. The pain, obstipation and other symptoms of strangulation persist, with a fatal termination unless relieved by operation.

The presence of the properitoneal sac when filled with gut or omentum can be recognized in some cases. In those in which the sac is directed upwards and outwards, the presence of a tumor or tumefaction makes it possible to map it out.

When the sac is directed downwards and inwards toward the bladder, or when it is directed backwards in the pelvis, its deep location precludes the possibility of its recognition by palpation or percussion. In Breiter's collection of 36 cases, it was possible in 22 to recognize a tumor which was proved either by autopsy or operation to be the properitoneal sac.

Moynihan believes these figures to be incorrect, and supports his argument by the examination of specimens found in the museum of the London Hospital. These show that in the majority of cases the direction of the sac is such that it could not possibly be recognized by means of physical examination during life.

Strangulation of the properitoneal (or of any variety of bilocular) hernia may happen in one of three places. (1) It may occur in the common orifice of the two sacs. If the hernia appears to have been reduced, it means that the contents of the inguinal sac have been pushed into the deep sac without affecting in any way the part strangulated. If the sac occupies a position which will permit of its being recognized by palpation, the persistence of the symptoms of strangulation are easily explained. The absence of a tumor indicating the presence of a properitoneal sac should not however deter a surgeon from operating in cases of apparent reduction in which the symptoms of strangulation continue. The case of Schmidt, detailed above, demonstrates the great necessity of making a careful search of the hernia region for the properitoneal sac.

(2) Strangulation may take place at the neck of the properitoneal sac. If there is no external evidence of the

existence of this sac, the case will pass for one of intestinal obstruction. The cause will only be revealed after the abdomen has been opened. In all cases of obstruction when there is a reducible hernia, the possibility of a second interstitial sac lodging a loop of gut should be considered.

(3) If the constriction occurs at the neck of the inguinal sac, the case is one of ordinary strangulated hernia. The properitoneal sac may be overlooked even in cases submitted to operation.

CASE II.—*Left Inguino-interstitial Hernia (Hernia Inguino-Subfascialis); Herniotomy; Recovery.*—Adolph K., aged 65, entered the St. Luke's Hospital, July 3, 1905. History: Patient has had a large left inguinal hernia for about thirty years. He states that he has worn a truss for fifteen years and that during the last five years it has failed to retain the hernia completely. Examination while the patient is standing shows that the hernia reaches the bottom of the scrotum and is larger than two fists. The external inguinal ring and the inguinal canal are very large, admitting readily two fingers. There is marked impulse on coughing. When erect, the tumor reaches from the bottom of the scrotum upwards and outwards near the anterior superior iliac spine. When reclining the scrotal enlargement nearly disappears. The tumor between the external ring and the anterior superior spine does not disappear, but becomes less prominent. If an effort to rise is made when the patient is reclining, the inguinal tumor becomes very prominent and its walls quite tense. On percussion it has a uniform tympanitic note. Compression of this tumor causes diminution in size but not complete disappearance.

Both testicles are in the scrotum; both are normal in size, position and consistency. The patient complains principally of a feeling of dragging and weight in the abdomen, and has entered the hospital for the purpose of securing relief through operation.

Operation on July 7, 1905, under Ether Anæsthesia.—The usual incision employed in herniotomy was made, exposing the external inguinal ring and the cord. A hernial sac was found

extending from the external ring down into the scrotum. The relation of the testicle and cord to the sac showed that the sac was acquired and not congenital. After freeing the sac from its attachments up to the external ring, it was opened and found empty. The aponeurosis of the external oblique was then incised from the external to the internal ring, exposing the neck of a second sac. Further division of the external oblique showed this second sac to be about 3½ inches in length and connected with the first or inguinal sac, both sacs opening into the abdominal cavity by a common orifice which admitted two fingers. The second sac lay underneath the aponeurosis of the external oblique resting upon the internal oblique. When opened it contained a loop of intestine about six inches in length which was not adherent and which was readily replaced into the abdomen. The two sacs were drawn outwards, the common neck loosened from the internal ring, a purse-string suture was passed around it and the sacs removed by cutting through this neck. The abdominal cavity was closed by tightening the purse-string suture. The operation was completed by Bassini's method for radical cure of hernia. Healing by primary union, with cure of the hernia.

This case represents the commonest form of interstitial hernia. The classification of these herniæ is based upon the position occupied by the interparietal sac. Any hernia in which a portion of the sac is placed in the planus of the abdominal wall is called interstitial or interparietal. Taking this definition we find clinically that the inner sac has been found: (1) Between the peritoneum and transversalis fascia—the so-called properitoneal hernia, which represents the rarest type of interstitial hernia. (2) Between the internal oblique and the aponeurosis of the external oblique muscles. This is the most common form and was first described by Goyrand [10] and called by him Hernia Inguino-Interstitialis. It is also termed Hernia Inguino-Subfascialis by Strubel. (3) The parietal sac may lie between the skin and the external oblique. This variety was first described by Kuster [11] and termed Hernia Inguino-Superficialis. In this type the superficial sac may pass upwards to-

ward the anterior superior spine of the ilium or may reach downward onto the thigh as in Busch's [12] case. In Brocas's [13] case it extended upwards and inwards toward the umbilicus. In other cases the sac has been found as far down as the perineum. In women it frequently is found beneath the skin of the labium.

In etiology the three types of interstitial hernia have much in common. Much of what has been said concerning the cause of properitoneal hernia applies to the subfascial and superficial varieties. The congenital pouches of Rokitansky of course cannot be considered as an etiologic factor. Abnormalities of the testes occur frequently. McCready's Tables show that about 73 per cent. of the cases are associated with arrest of descent or some other abnormal condition of these organs. Moynihan considers retained testis as the most important cause of interstitial hernia. This is accomplished by the testis obstructing the inguinal canal, there barring the descent of the hernia, which in the end causes bulging of the sac in the direction of least resistance. In these cases, as in properitoneal hernia, the use of an improperly fitting truss would appear to be of importance as a factor in developing the diverticulum that forms the interparietal sac.

The diagnosis of interstitial hernia is generally easily made if the anatomic types of hernia are kept in mind. The bulging parietal sac can generally be easily recognized. The frequent association of this form of hernia with anomalies of the testes should direct attention to the possibility of this hernia when imperfect descent of these organs exists. Strangulation of the subfascial and superficial types unlike that of the properitoneal is infrequent.

The treatment of interstitial hernia, including the properitoneal type, can be only operative. The wearing of a truss can do nothing but harm. The presence of a retained testis is always a contraindication to the use of a truss in any hernia. When a parietal sac exists it can only increase the already great risk of strangulation.

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THE ETIOLOGY OF CERTAIN CONGENITAL TUMORS OF THE GROIN.

THEIR RELATIONSHIP TO HERNIAL SACS.

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IN 1896, by one of the curious coincidences that often arise in Surgical Work, there came under my care at the Melbourne Hospital for Sick Children, two cases of benign tumor of the groin, evidently similar in nature, the etiology of which was at the time quite unknown to me.

The notes of the cases are as follows:

CASE I.—Boy, aged 6, with a tumor the size of half an orange at the upper part of the left thigh, a little below the femoral opening. Soon after birth a small lump was noticed there, but it had gradually and very slowly enlarged. The tumor was occasionally the seat of attacks of pain and tenderness; these attacks had been somewhat more frequent of late, and were attended with some enlargement of the tumor, which enlargement would subside as the attack passed off. The tumor gave the sensation of a soft solid, but there was no lobulation and no attachment to the skin. After removal it was found to be not encapsuled, and presented the appearance of a mass of fatty tissue, loosely held together by a fibro-areolor reticulum; in the centre of the tumor there was a single cyst with clear fluid contents. Our pathologist, Dr. Mollison, reported that microscopic examination showed in addition to the fibro-fatty tissue, a large admixture of unstriated muscle fibre.

CASE II.—Boy, aged 5, presented a diffuse mass involving the upper and inner part of the left thigh and groin, extending upwards and inwards over Poupart's ligament to the hypogastric and inguinal regions. As in the first case, the tumor appeared to be slowly increasing in size, and the child suffered occasionally

from tenderness and discomfort. The operation of removal entailed a somewhat extensive dissection, but the following characters were noteworthy. Emerging from the femoral canal, where it was thin and stalk-like, it passed upwards and inwards in the manner described, spreading out fan-like over the pubic and inguinal regions. It contained a large number of cysts, which formed a continuous series from the femoral canal to the fan-shaped mass above, throughout which they were irregularly distributed, as depicted in the diagram. The structure of the tumor was reported by Dr. Mollison to be identical in nature with that of the former case. There is no record of any special examination of the minute structure of the walls of the cysts. The accompanying diagram (Fig. 1) will serve to show the positions occupied by the two tumors, which were both on the left side.

It is worthy of mention that Case I came again under my care six years later for a right inguinal hernia. The result of the first operation had remained perfectly satisfactory. Case II I have been unable to trace.

From the circumstance that I have met with no other examples than these in my experience, I gather that such tumors must be of great rarity, though doubtless other surgeons may be able to recall similar cases. I am not, however, aware that these growths have been specially described nor that any suggestion as to their etiology has been offered. It has accordingly been a matter of great interest to me to find the explanation of the occurrence of these singular tumors incidentally provided in the course of some clinical observations I have been enabled to make during the last few years on the origin of the femoral hernial sac.

There appears to me no reasonable doubt that the etiology of these tumors is identical with the etiology of the femoral sac. As, however, the congenital origin of the femoral sac is not as yet universally admitted, may I be permitted in the first place briefly to outline the views I have already expressed fully on two previous occasions in the *Lancet,* as to the nature and congenital mode of occurrence of the femoral sac? I

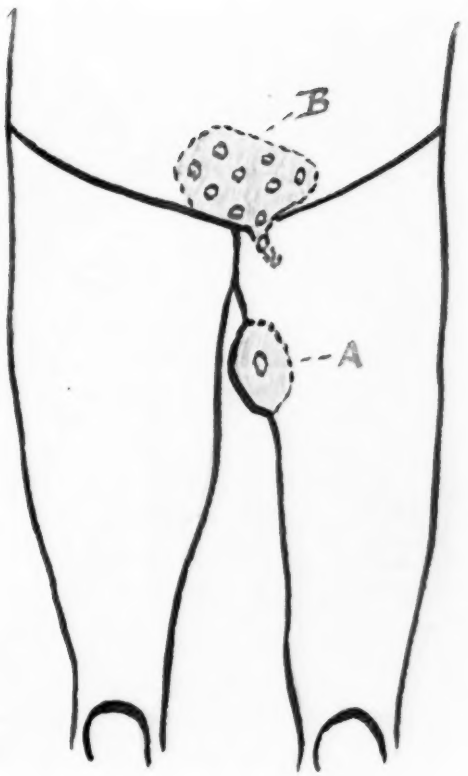

FIG. 1.—Showing position of the tumors in the two cases. *A*, Tumor in Case I. *B*, Tumor in Case II.

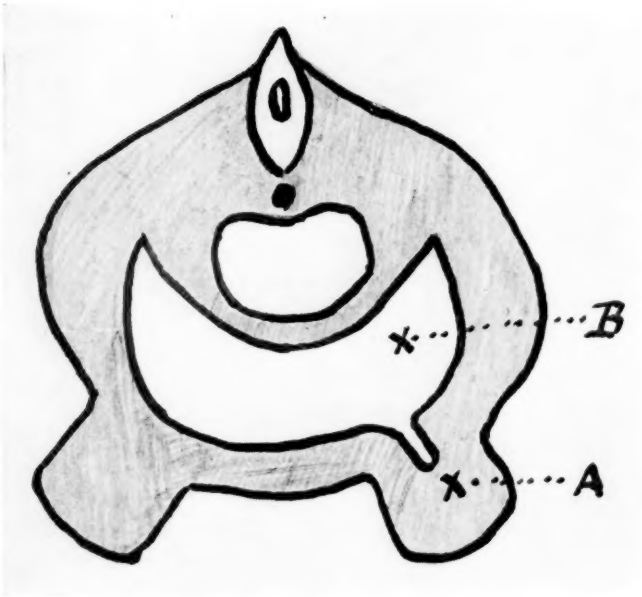

FIG. 2.—Diagram of embryo in section at about second month. *A*, Limb-bud with pouch from pleuroperitoneal cavity. *B*, Pleuroperitoneal cavity.

cannot do better than by giving verbatim one or two short extracts from a paper on the congenital origin of Hernia: (*Lancet,* March 12, 1904.)

"At an early period of embryonic development, the three primary layers of the embryo become arranged in the manner depicted diagrammatically in Fig. 2. Ventrally, two main layers are formed, the somatopleure closing in the primitive alimentary canal, and the splanchnopleure constituting the body-wall. Between these two layers is situate the primitive pleuro-peritoneal cavity, enclosed throughout by mesodermic tissue, on the inner surface of which a layer of cells, flattened and stratified, will ultimately become specialized as the endothelial structure of the peritoneum. During the second month, bud-like projections are extruded from the surface of the body-wall, which are the rudiments of the four limbs. These buds are projections of the whole thickness of the body wall, and it may quite probably be a normal event for a pouch of peritoneum to be included in the bud (Fig. IIA), and to become subsequently obliterated. Whether this inclusion of a pouch of peritoneum is a normal event, or whether it is a developmental accident, matters not at all. That which does concern us is the fact that such a pouch of peritoneum is not only often formed but that it often persists; further that it may occur in more than one situation in the limb but that its most frequent seat is in the immediate vicinity of the main vessels, in the future crural canal. This peritoneal pouch having been formed at a very early period, it becomes a matter of extreme interest to trace its destiny, and see how it will fare during the period of rapid changes associated with the developing limb.

I have been accustomed to show that the course so frequently seen to be taken by a femoral hernia upwards on to the abdomen, which has been a source of so much perplexity to surgeons, is in reality nothing more than the inevitable result of the congenital origin of the femoral sac. I have illustrated this by a diagram (Fig. 3), which depicts the result of the evolution of the limb upon the branches of the common femoral artery.

"The explanation of the somewhat retrograde course pursued by these becomes very evident if we refer back to the first beginnings of a vascular system in the embryonic limb-bud. The first branches that are given off from the main vessel of the limb-bud will be apportioned to structures that are destined to form part of the abdominal wall, so that when, in the course of development, the groin becomes deepened, and the limb undergoes changes that are to fit it to straighten out, it will at once be seen

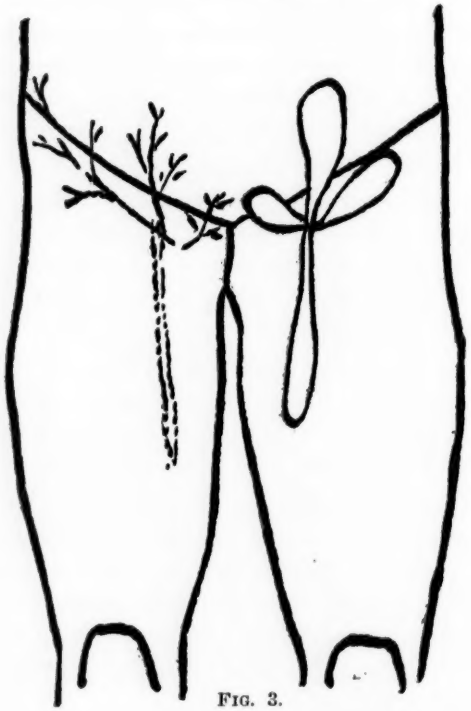

FIG. 3.

how it comes about that the superficial epigastric artery and its fellows follow the course they do. A little twig passing directly upwards will ultimately become the superficial epigastric; another with a slightly outward tendency will become the circumflex iliac, and one or two passing somewhat inwards, the external pudics.

"And now that we have arrived at a conclusion as to the causes that have determined the course of the branches of the common femoral, it would seem reasonable to expect that a con-

temporaneous peritoneal sac, occupying a similar position in the evolving limb, should, in response to the same developmental influences, incur a like fate. So that one sac, which is of sufficient length, and suitably disposed at its inception, would assume a position similar to that of the epigastric artery; another, in like manner, will display an outward and upward direction like the circumflex iliac; while yet another will follow a course corresponding to that of the external pudics; and this is exactly what we find.

"It is impossible to look at Fig. 3, which represents the branches of the femoral artery on one side, and the favorite positions assumed by femoral sacs on the other, without being impressed with the conviction that the developmental influences which determine the course of the arteries on the one hand, and the position of the hernial sacs on the other, are identical."

Thus it is clear that any structure which at the first appearance of the limb-bud should chance to be placed as it were on the borderland between the future limb and the future abdominal work, will inevitably in the completed process of development come to have one end in the limb and the other in the abdominal wall, and will thus occupy precisely the position of the branches of the femoral artery, and also of the hernial sacs that pass upwards, from the femoral opening across Poupart's ligament. Moreover, I submit that in no other way than that here suggested, could any anatomical structure come to occupy such a position.

The correctness of this view as to the etiology of the sac of femoral hernia has been confirmed by a quantity of clinical evidence which it is unnecessary for me to re-state here. There is, however, one or more short quotation which I will make from a paper from which the previous extracts have been taken. This deals with the structure of the femoral sac, and has a very direct bearing upon the subject before us, and is as follows:

"It (the femoral sac) is often a thick structure, lined it is true with endothelium continuous with the peritoneum, but com-

prising in addition a quantity of unstriated muscle fibre, fibrous tissue and fat."

It will be noted that the tumors I have described are identical in composition with the femoral sac as here described, with the sole addition of certain cysts. In addition to their structure the positional arrangement of the tumor in Case II furnishes conclusive evidence of its mode of origin. In Case I, taken alone, the position of the tumor would have afforded evidence that was merely inconclusive.

The cysts still remain to be accounted for. Assuming the suggested origin of these tumors from a diverticulum of the primitive pleuro-peritoneal cavity to be correct, have we any direct evidence bearing upon the origin of the cysts ? I myself have met with but one instance in which a cyst has been formed in the wall of a hernial sac. This was, however, the funicular process, and the case is described in the paper from which I have already quoted. Cysts in connection with hernial sacs have occasionally but very rarely been described, but one case that occurred in the practice of the late Mr. Hulke presents features of special interest. I am indebted for the description of it to Macready's " Treatise on Ruptures," from which I will extract a few lines:

" During the operation for a strangulated femoral hernia a ' glistening membranous bag came into view.' The membranous bag was opened and serum escaped. The interior was a smooth-lined cavity whose posterior wall was convex, tense, elastic, in some parts blue and thin, in others glistening, white and tendinous. It was overrun by a net of large veins. At first sight this resembled an ovarian cyst, but on tracing its convex surface it seemed everywhere adherent at the periphery. It was opened and a few drachms of clear serum were let out. In the floor of this second cyst a third, still deeper and distinctly limited sacciform space was discovered, which also contained serum. Through the posterior wall of this third cyst a small globular body about the size of a grape was felt which proved to be the true sac."

Summary.—The congenital origin of the femoral hernial sac is shown by (1) its composition, especially by the presence of a thick fibro-fatty covering containing a quantity of unstriated muscle fibre; (2) by the various positions it assumes, especially in passing upwards on to the abdomen; (3) by various other characteristics which are matters of clinical observation and have been dealt with elsewhere. From the study of these features we deduce the conclusion that the femoral sac is formed by the inclusion in the embryonic limb-bud of a diverticulum from the primitive pleuro-peritoneal cavity with its mesoblastic wall.

Turning to the two tumors, they are obviously identical in nature one with the other, and both by their position and structure they proclaim their identity in origin with the femoral sac. It would, therefore, seem reasonable to conclude that they also owe their origin to the accidental inclusion in the embryonic limb-bud of a diverticulum from the primitive pleuro-peritoneal cavity.

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THE DETERMINATION OF THE FUNCTIONAL CAPACITY OF THE KIDNEYS.

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THE determination of the combined and individual functionating power of the kidneys is one of the most important considerations connected with the modern treatment of surgical diseases of these organs. The problem is a threefold one. Firstly, what is the combined work of the kidneys; secondly, what part of the total work is each organ doing; and thirdly, what work can each one do, if its fellow is removed or seriously injured,—*i.e.*, what is the potential functional capacity of each organ?

This last bears no constant relation to the former. Thus, it is not at all uncommon for a healthy kidney that is potentially able to perform the work of both organs to do temporary insufficient work because of a diseased condition of its fellow; and, *vice versa,* kidneys that are doing enough work may functionate altogether insufficiently when one or both of them are subjected to an incisive surgical procedure.

Experience has taught us that a single healthy kidney usually has the potentiality for doing work that is sufficient for the needs of the body, and furthermore that if the functional power of such an organ is hindered a removal of the cause thereof will be followed by a complete resumption of its sufficient functional work. On the other hand, we have also learned that a considerably diseased kidney has not the potential capacity of doing the entire work of the body. Whenever, therefore, a nephrectomy is contemplated it is of the utmost importance to determine the health or disease of the other organ. If the urine which is drawn from the latter by aseptic ureteral catheter shows it to be healthy the operation

may be proceeded with, even though its functional capacity is for the time being insufficient, for such an organ will manifest sufficient functional capacity when its diseased fellow is removed; if, on the other hand, the urine from the remaining kidney points to extensive disease therein, all incisive procedures upon the more diseased side should be abstained from, even though the functional capacity of the two organs at the time of our examination is a sufficient one.

The combined work of the kidneys is determined from the cryoscopic index of the blood,—*i. e.,* its freezing-point, and from the amount of urea which is eliminated in the urine in twenty-four hours; and the work of the individual organs is ascertained from the percentage of urea in the individual urines, from the amount of sugar and chromogen in each urine after a hypodermic injection of phloridzin and methylene blue respectively, and from the cryoscopic index,—*i.e.,* the freezing-point of the individual urines.

As the work of a kidney corresponds to the amount of secreting parenchyma it contains a comparison of the work done by the two organs will often indicate which one is diseased and if both are affected it will reveal which is the more extensively involved.

The Cryoscopic Index of the Blood.—The duty of the kidneys is to eliminate from the blood the waste products of tissue metabolism. In comparison with the other emunctories they are by far the most active, and if they functionate insufficiently these waste materials will accumulate in the blood and increase its molecular concentration. The determination of the latter, then, should give us information of the work that is being done by the kidneys. To ascertain the molecular concentration of a fluid we find out its freezing-point,—*i.e.,* its cryoscopic index, for this is directly proportionate to the number of molecules the fluid holds in solution.

The normal freezing-point of the blood is 0.56° to 0.60° C. below that of distilled water, and of course the greater its concentration is the lower will this freezing-point be. Thus

with insufficient kidney function the freezing-point falls below 0.60° C., in one case of the writer, to 0.87° C. The first question that arises is how constant is the freezing-point of the blood with normal functionating kidneys and the next query is how reliable an index of insufficient combined kidney function is a depression of the freezing-point below the normal. In the first place, it is essential to remember that one-fourth of the total kidney-tissue is sufficient to perform the work of the kidneys and to maintain the freezing-point of the blood at its normal level. With this preliminary note, it may be said that with sufficient kidney function the freezing-point of the blood is fairly constant at 0.56° C.–0.60° C. below that of distilled water. There are fluctuations, however, and amongst the most common causes of these may be mentioned large intra-abdominal tumors especially of the kidneys; heart disease, insufficient oxidation of the blood from respiratory disease, and one-sided renal pain. In these conditions the freezing-point of the blood may fall far below its normal level, and yet there may be no disturbance in the sufficiency of the kidney action; due allowance must, therefore, be made in them for abnormal depression of the cryoscopic index. Again, a severe anæmia, which is common enough in kidney diseases, may prevent the freezing-point of the blood falling to that level which would correspond to its molecular concentration.

Thus one might meet with a case in which with considerable insufficiency on the part of the kidneys, the freezing-point of the blood is, nevertheless, near the normal because of the severe grade of anæmia that is present.

With the exception of the abnormalities due to the causes just mentioned, we may say that a normal freezing-point of the blood,—*i.e.*, 0.56° C. below that of distilled water, indicates sufficiency of kidney function. It does not by any means permit us to infer that the kidneys are entirely normal, nor that their function will be sufficient after incisive operations upon them. If we remember that one-fourth of the total kidney-tissue can thoroughly well perform the entire work

of the kidneys we will understand how it is that cases, in which the freezing-point of the blood was normal before operation, exhibited marked insufficiency of kidney action after operation. For in such cases the kidneys either did not possess the potentiality for increased work, a *sine qua non* for the remaining kidney if there is to be a successful issue after nephrectomy, or by the operation we destroyed or injured enough of the remaining working parenchyma to seriously interfere with the sufficiency of the kidney action.

Furthermore, if a normal cryoscopic index does not indicate a potentially sufficient organ, neither does an abnormally low freezing-point always indicate a potentially insufficient organ, for we have seen above that a potentially sufficient organ may be temporarily insufficient because of the disease of its fellow.

In other words, the cryoscopic index of the blood merely indicates the work that is being done by the renal organs. It teaches us nothing of the health or disease of the kidneys, for three-fourths of the total kidney-tissue may be destroyed and yet the remaining one-fourth will be sufficient to maintain the normal molecular concentration of the blood; nor does it afford an indication of their potential functionating power. Only in connection with the health or disease of the individual organs can the freezing-point of the blood be considered as a help in this latter respect. Thus, if one kidney is diseased and the other is healthy or not much affected a normal freezing-point of the blood would point to a potential functional sufficiency of the latter and would permit of our removing the diseased organ. But an abnormally depressed freezing-point is not under these conditions to be construed as evidence of the potential insufficiency of the remaining kidney and therefore to speak against the advisability of doing nephrectomy. Furthermore, if the separately collected urines show that both organs are more or less extensively affected, a normal cryoscopic index of the blood is not proof of the potential functional sufficiency of either organ, and in such cases we should refrain

from nephrectomy or from any severe operation upon the kidney parenchyma even though the freezing-point of the blood is normal.

The relation of the cryoscopic index of the blood to the potential function of the kidneys may be summed up as follows:

(1) A normal cryoscopic index of the blood when there is one healthy and one diseased kidney would indicate a potentially sufficient functional capacity of the sound organ and would warrant us in doing a nephrectomy.

(5) An abnormally low cryoscopic index of the blood when there is one healthy and one diseased kidney does not indicate potential insufficiency of the former for the function of this organ may be only temporarily impaired by the diseased fellow organ. In such cases nephrectomy may nevertheless be done safely.

(3) A normal cryoscopic index of the blood when there is one slightly diseased and one extensively diseased organ would usually point to a potentially sufficient functional capacity of the less diseased organ and would allow of our doing a nephrectomy or other operation upon the more affected kidney.

(4) A normal cryoscopic index of the blood when there is more or less extensive affection of both kidneys does *not* mean a potentially sufficient functional capacity of these organs, and does not permit of our removing one or even of incisively attacking either organ.. And, finally,

(5) An abnormally low cryoscopic index of the blood with more or less extensive disease of both kidneys indicates their potential insufficiency and strongly speaks against the advisability of doing any operation upon them.

The Cryoscopic Examination of the Urine.—The molecular concentration of the urine varying as it does normally between wide limits according to the functional activity of the kidneys, their nervous and circulatory conditions, and the amount of fluid that is ingested, causes its freezing-point to likewise fluctuate considerably. This makes the cryoscopic index of the urine of less value as an indication of the secretory activity of the kidneys.

The urine of healthy kidneys, under normal conditions of circulation and nervous influence, and moderate ingestion of fluids, freezes at 1.2° C. to 2.2° C. below distilled water. With renal insufficiency less molecules are eliminated from the blood and consequently the molecular concentration of the urine,—*i.e.*, the number of molecules it contains in solution diminishes and its freezing-point consequently rises,—*i.e.*, approaches nearer to that of distilled water. If after moderate ingestion of fluids and with no disturbed circulatory or nervous condition the freezing-point of the urine is less than 1° C. below that of distilled water, renal insufficiency may be assumed.

The cryoscopic index of the separated urines affords a clue to the functional activity of the individual organs. For if we compare the freezing-points of the separated urines, collected at the same time and under the same circulatory and nervous conditions, we can gain an idea of what proportion of the combined kidney work each organ is doing; and further, as the work which is performed depends largely on the amount of secreting tissue in the organ, we may by a comparison of the freezing-points of the separate urines ascertain the extent of disease in each kidney.

The combined individual functional activity of the kidneys can also be determined by estimating the percentage of urea in the combined urines and individual urines respectively. A healthy individual being on a mixed diet, and doing an average amount of exercise and work eliminates about 500 grains of urea in the twenty-four hours; patients in bed and on a fluid diet eliminate about 300–400 grains in the twenty-four hours. Any marked decrease below 300 grains per diem is to be taken as an indication of impaired functional activity of the kidneys. The comparison of the percentage of urea in the separated urines, just as the comparison of the cryoscopic index of the separated urines furnishes an indication of what proportion of the combined work each kidney is doing, and likewise enables us to draw an inference as to whether both organs are diseased, and if so which is the more extensively involved.

The comparative value of these methods for determining the functional activity of the kidneys is not at all settled. Casper and Kümmel maintain that the cryoscopic index of the blood and of the combined and separate urines furnishes the best indication of the functional activity of the kidneys, whereas Israel, Rovsing and others insist that these methods for determining the kidney function are altogether too uncertain and too unreliable. Rovsing depends upon the urea percentage in the combined and separated urines as an indication of the amount of work that is being done, and upon the analysis of the urine for evidence of the health or disease of the kidneys. He maintains that a kidney which secretes healthy urine, containing a normal percentage of urea, is functionally sufficient, and can be relied upon to satisfactorily perform the work of the body.

Casper and especially Kümmel would reject all cases for nephrectomy or major operation in which the freezing-point of the blood is below 60° C. But this arbitrary practise is as has been shown above, entirely unwarranted. Thus the writer has had several cases recover after nephrectomy, in which the freezing-point of the blood was below 0.60° C.,—*i.e.*, 0.63°, 0.65°, 0.67° C., and other surgeons have had similar experiences. On the other hand, it is wrong to entirely reject, as Israel and Rovsing do, the evidence of kidney function that cryoscopic examination of the blood and of the combined and separate urines furnishes. The data these afford, viewed in the proper light, are additional evidence of the work the renal organs are doing and of their potential functional power. There can be no doubt that the best results will be obtained if all the methods are used.

The practise of the writer is to catheterize both ureters and collect the urine separately from each kidney. This is then carefully examined. The cryoscopic index of the blood and of the separated urines, and the percentage of urea in the combined and separated urines is then ascertained and by study and comparison of the data thus afforded no difficulty is experienced in determining the health or disease of the individual

organs, their combined and individual functional capacity, and the extent of the disease in each organ.

The phloridzin and methylene blue tests for the determination of the functional capacity of the kidneys have the same underlying principles as the cryoscopic index and urea percentage of the individual urines. Of the two the phloridzin is the more rapid and reliable. These tests rest upon the fact that after a subcutaneous injection of phloridzin sugar is eliminated in the urine and after a hypodermic injection of methylene blue various chromogen bodies are excreted in the urine. To carry out the tests both ureters are simultaneously catheterized and then 0.005 gm. of phloridzin, or 0.05 gm. of methylene blue are injected subcutaneously. As healthy organs are supposed to eliminate from phloridzin and methylene blue the same amount of sugar and chromogen respectively in the same time, a comparison of the percentage of sugar or chromogen which is eliminated by each kidney during the same period should enable us to determine the extent of disease in each organ and the amount of working parenchyema which is present.

In the methylene blue test it is likewise important to determine the time the chromogen first appears in each urine, and the rapidity and duration of its elimination.

Neither of these last tests can be relied upon for determining the health or disease of the kidneys, nor do they afford reliable data of the potential functional power of these organs, or of their actual work.

URETERAL CALCULUS.

WITH A REPORT OF FIVE CASES.[1]

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A SURGEON who is called to operate upon five patients suffering from ureteral calculus within as many months, has his attention somewhat forcibly drawn to the importance of diagnosis, and to the difficulties of treatment of this class of cases. In former years calculi arrested in the ureter were considered rare, but since more accurate methods of making a diagnosis in urinary surgery have been available, the frequency with which this condition is present has become more widely appreciated. According to Dr. C. L. Leonard [1] the use of the Röntgen rays has proved the ratio of ureteral to renal calculi to be as 66 is to 33 in cases where the diagnosis has not been confirmed by operation or recovery of the stone, and as 44 is to 29 in cases where the X-ray diagnosis has been thus confirmed.

Renal calculi in their descent to the bladder are prone to be arrested at three points in their course: (1) Two inches from the pelvis of the kidney, as the ureter bends forward over the psoas muscle; (2) at the brim of the pelvis, where it dips down across the bifurcation of the common iliac artery; and (3) close to the vesical orifice of the ureter. The normal ureter is said to be one-seventh of an inch in diameter at the upper, one-fourth of an inch at the middle, and only one-tenth of an inch in diameter at the lower constriction. In the 44 cases of ureteral calculus referred to by Morris [2] the stone was arrested at the upper constriction in 19 instances, at the pelvic brim in ten and at the vesical extremity of the ureter in 15. These figures

[1] Read before Philadelphia Academy of Surgery, February 5, 1906.

correspond very closely to those given by Bovee,[3] who collected 64 operations in which an impacted calculus was removed from the ureter by the extraperitoneal route. Among these, 22 were found near the upper constriction, 17 at the pelvic brim, and 18 close to the bladder; while the remaining stones were found at other portions of the ureter.

The symptoms produced by the passage of a renal calculus are sufficiently familiar, and it only remains, after such symptoms have arisen and have subsided, to determine whether the stone has been forced back into the pelvis of the kidney, has been discharged into the bladder, or whether it has been arrested at some point in its journey. If it escapes into the bladder, symptoms of vesical calculus arise; and if the stone remains in the kidney those of renal calculus continue. The point that chiefly concerns us is to determine at what point of the ureter the stone has lodged. This is not always possible from the symptoms alone. Indeed Mr. Freyer[4] asserts that the symptoms produced by ureteral calculus are precisely those of renal calculus, except when the stone is lodged in the lower end of the ureter, within an inch or so of the bladder. He admits indeed that tenderness at the seat of impaction may be a guide, but claims that the Röntgen rays are even less satisfactory than in cases of renal calculus. Although I cannot entirely agree with his premises, I heartily endorse his conclusion, which is that the rule of surgery in doubtful cases is to first explore the kidney through the loin, and to pass a sound down the ureter before concluding the operation. If a stone is found in the ureter the wound should be enlarged, and the calculus extracted by appropriate means.

It appears to me, that tenderness at the seat of impaction and the information gained by a technically perfect skiagram, are two very valuable aids to diagnosis. From the symptoms alone it may be possible to determine that renal calculus has existed, and that a calculus is still present, either in the kidney or in the ureter, or in both. It is because we cannot be certain that not more than one calculus is present, that it becomes

necessary to make sure that none is overlooked in the kidney even after the stone found in the ureter has been extracted.

A skiagram to be of value in these cases must throw a shadow of structures less dense than the least dense calculus; and as phosphatic and uric acid stones are by no means dense, it is necessary to see the shadows of the psoas muscle, to make sure that no calculus is present.

If after an attack of renal colic symptoms of renal calculus persist, we may be certain that the stone has at any rate not travelled as far as the lower ureter. In the latter case the symptoms of vesical calculus arise, and though no calculus can be found in the bladder, its location may usually be detected by rectal palpation or by cystoscopic examination.

Although a calculus may remain lodged in the ureter indefinitely without producing serious symptoms, yet such cases are exceptional and were such a calculus to be discovered by chance, it is questionable whether it would not be the surgeon's duty to remove it as a prophylactic measure. Leonard [5] refers to 26 calculi, found as it were by accident, impacted in the ureter, all of which were safely passed into the bladder while the patients remained under medical care. Cabot [6] thinks highly of massage in such cases as an aid to the descent of the stone. But it seems to me that the dangers which may ensue from neglect of ureteral calculus are greater than those which attend its removal by operation. Among 21 operations mentioned by Fowler [7] there were only three deaths; and in reviewing the literature of the last couple of years while preparing this paper, records of 25 operations for ureteral calculus have been found, many of them not in Fowler's list, with only 2 deaths—one in a patient with recurrent carcinoma of the ureter, and the other in my own patient, to be presently mentioned.

If the stone is rough and mammillated it is more apt to excite ulceration and inflammation, although less apt to absolutely occlude the ureter than a smooth stone. On the other hand, while a small stone may be more easily passed by ure-

teral peristalsis and by the *vis a tergo* of the kidney's excretion, yet if it does become arrested it is almost certain to cause hydronephrosis, and give rise to serious symptoms in a short time. When such cases are seen before marked infection is present, the mortality from the operation is slight, as the kidney does not then require removal. The condition of the kidney is really, I think, the main point upon which the success of treatment must depend. In the only one of my cases which terminated fatally, there were calculi impacted in both ureters and the operation which removed the stone from the left ureter was unsuccessful because of the diseased condition of the right, which was not known until the post-mortem examination.

The route to be chosen for the removal of the stone is a matter of much importance. If the stone is known to be near the bladder, it is usually most successfully removed intravesically. In the female the vaginal route has been employed, and the ureter exposed within the layers of the broad ligament. This appears to be less satisfactory a method than the intravesical, and the same may be said of the perineal route in the male. In the female the urethra can be dilated sufficiently to admit suitable forceps, or even the finger, and, after slightly incising the vesical orifice of the ureter, the calculus can usually be extracted without much difficulty. This plan obviates the possibility of a vesico-vaginal or uretero-vaginal fistula, which is not very remote when the vaginal route is chosen. In one of Freyer's patients the ureter was exposed by incising the vagina, but the stone slipped further up the ureter and could not be extracted. It was, however, found in the dressings on the following day; but the patient developed pelvic cellulitis, had a very slow convalescence, and when last seen still suffered from kidney symptoms. In the case of a patient where intravesical manipulations had failed to dislodge the stone, Millet [8] succeeded in evaginating the obstructed ureteral outlet through the dilated urethra, by means of one finger within the bladder and another in the vagina. With the

parts thus under full control he was able to remove the calculus with success. Crawford [9] successfully removed from a male patient a calculus measuring one and three-eighth inches in diameter by intravesical dilatation of the ureter. In the third case recorded to-night I found it impossible to extract the stone extraperitoneally, and accordingly opened the bladder above the pubes, and by slightly incising the ureter was enabled to deliver the stone into the bladder and successfully remove it.

But this means will not suffice unless the calculus is lodged very close to the vesical orifice of the ureter; and for those stones impacted more than an inch away from the bladder wall, I would strongly recommend the extraperitoneal operation. This is of course the route selected in cases where the location of the calculus is doubtful, since it affords access to practically the entire length of the urinary tract. In enlarging the lumbar incision downwards care should be taken not to injure the spermatic cord, and at the conclusion of the operation the anterior abdominal wall should be repaired as after an operation for ventral hernia. Even in a child of 3 years Betham Robinson [10] exposed, extraperitoneally, the ureter close to the bladder wall and successfully removed the impacted calculus.

As the peritoneum is stripped back from the iliac fossa, it carries the ureter along with it, and this structure is therefore to be sought on the vesical side of the wound. Proper knowledge of pelvic anatomy is essential to the operation. When a stone is exposed in the ureter, it is proper to try to dislodge it, and to push it either upward into the pelvis of the kidney, or down into the bladder. In doubtful cases, where the kidney alone is first exposed, it may be possible to push the calculus on into the bladder by a bougie, or even to extract it through the kidney by means of the urethral forceps. If it can be pushed on into the bladder it can be satisfactorily removed by the evacuator.

An incision into the ureter itself is usually to be avoided, although in my own opinion the probability of a permanent urinary fistula remaining is exaggerated. But an incision

through the renal cortex, or one directly into the pelvis of the kidney, is to be preferred, since the tract required for drainage is shorter, and the wound may be more closely sutured. But if the calculus cannot be dislodged, it is safer to incise the ureter than to attempt to crush the stone *in situ*. If the calculus is oxalate of lime it may be impossible to crush it, without so injuring the ureter as to cause sloughing; and even if it could be successfully crushed, the detritus would be very likely to give rise to very serious trouble before being completely evacuated. The plan adopted by Mitchell [11] and by Corson [12] of placing sutures before extracting the stone, thus using the calculus as a bobbin, may prove advantageous when the wound is deep. It has been my practice to employ when possible two rows of sutures, the first, of catgut, for the submucous tissues, and another of silk, and of the Lembert type, for the muscular walls of the ureter. This plan I am convinced decreases the probability of a urinary fistula persisting. Fiori [13] has recently recorded a remarkable operation in which he exposed the ureter extraperitoneally, split it for a distance of sixteen centimetres (12 centimetres in its abdominal and 4 centimetres in its pelvic portion) and thus succeeded in extracting 11 or 12 small calculi, the largest weighing 5 grammes, being impacted close to the bladder. He then reconstructed the ureter by sutures using a sound as a guide; and had the satisfaction to have the urinary fistula which resulted close a few days after the operation. Although, as he acknowledges, it was a difficult and somewhat hazardous operation, yet the event justifies his course of action in preferring uretero-lithotomy to nephrectomy, which would have been the only alternative.

Finally, a word may be said about the occurrence of carcinoma in the ureter, as the result of calculus disease. One of the patients I operated on showed the presence of carcinoma in the ureter immediately above the site of impaction, but this would probably have escaped detection if the kidney had not been so diseased as to require removal, and hence to allow a microscopical study to be made of the entire specimen.

Primary cancer of the ureter is admittedly rare. Metcalf and Safford[14] only one year ago were unable to find more than 7 authentic cases on record, including one of their own; and in a majority of these cases no calculus was present. It is probable that most cases of cancer of the ureter have escaped detection, and that as operations on the ureter are more frequently performed, such changes will be more often found. The mere possibility of malignant changes occurring, however, only serves to emphasize the need of prompt removal of the calculus.

The following cases of ureteral calculus are reported with the hope of exciting discussion among the fellows; and among some of the unsettled points on which I am anxious to learn their views, I would particularly mention the following:

The value of the X-ray and the cystoscope with bougieing of the ureter in diagnosis; the significance of localized tenderness. The propriety of exploring the ureter intraperitoneally to locate the suspected stone.

The question of removal of quiescent or latent stones.

The best route for the removal of juxta-vesical stones: whether perineal, vaginal, intravesical, suprapubic, or extraperitoneal.

The proper treatment of the stone when found: whether it should be pushed on into the bladder, should be crushed, or whether the ureter should be incised.

The best method of suturing the ureter.

Whether nephrectomy is to be countenanced, except for incurable disease.

All of the following cases were operated upon in the German Hospital:

CASE I.—*Ureteral Calculi (Impacted) Removal.*—Miss ——, white, aged 22. Admitted July 24, 1905. For past two years has complained of pain in right kidney region, referred downward into inguinal region; pain almost constant, but has had three attacks of severe pain at intervals of six months; duration seven to fourteen days, always accompanied by nausea, vomiting and dizziness.

Abdominal examination. Right kidney movable, not enlarged, no distention or rigidity, no tenderness over abdomen. No X-ray taken.

Operation; July 25, 1905. Vertical incision right ileocostal space; pelvis of the kidney found to be the seat of small hydronephrosis, about the size of a lemon; ureter found dilated to the size of the little finger. The ureter was incised and the fluid allowed to escape, a probe was introduced and a stone palpated; after much effort the stone was brought upwards and delivered through the opening in the ureter at the pelvis of the kidney. Discharged, cured, August 21, 1905.

CASE II.—*Nephrolithiasis Double. Impacted calculi both Ureters.* Mr.——, white, aged 33. Admitted September 7, 1905. On day of admission was seized with sudden acute pain in left lumbar region radiating from near crest of the ileum to the left testicle, testicle retracted. The patient was nauseated, suffered from frequent urination, passing large quantities. Abdomen soft, no rigidity, no pain on pressure over left kidney or course of ureter. No palpable mass. X-ray; dense shadow in region of right kidney.

Operation, Sept. 9, 1905. Oblique incision left flank.

Calculus found impacted in ureter 3 cm. below the pelvis of the left kidney. An effort was made to work the stone up into the pelvis, but failed; the kidney was delivered and an incision made horizontally to the poles into the pelvis and scoop and forceps used to deliver the stone, but failed. On palpation the stone was felt in previous location; an incision was made in the long axis of the ureter over the calculus and the same delivered. The stone was the size of a small pea, irregular and very hard. Before suturing the ureter a probe was passed into the bladder. This patient did well for three weeks, when he was seized with severe pain in the right loin and in a very short time became anuric and died October 10, 1905. Autopsy showed an impacted stone in the right ureter.

CASE. III.—*Urethral Calculus. Suprapubic Urethrolithotomy and Lumbar Incision.*—Mr.——, white aged 49. Admitted October 16, 1905. In 1896 was operated for acute appendicitis. In January, 1905, was seized with severe pain in right side referred downward to the right groin. Was operated for abdominal adhesions in June, 1905, but not relieved.

Present illness: Pain is paroxysmal, coming on suddenly at any time, beginning apparently in the right inguinal canal and referred to the right kidney. These attacks are followed almost immediately by vomiting, requiring morphine for relief, but are not followed by irritability of the bladder.

Abdominal examination: Tenderness on pressure at a point on the semilunar line opposite the anterior superior spine. X-ray showed large dense shadow in region of the kidney, and small one near bladder.

Operation October 30, 1905. Curved oblique incision right lumbar region to the anterior spine of the ilium. A stone was located in the ureter in the wall of the bladder. After many attempts to dislodge the stone either into the bladder or by drawing it up into the ureter, all of which were unsuccessful, the wound was covered and the patient placed in the dorsal position and the bladder opened suprapubically; the vesical orifice of the ureter was incised slightly and by pressure from behind the stone was finally brought into view and delivered. The stone was the size of a split pea and very hard. The suprapubic fistula closed on the eighteenth day. Patient was discharged cured November 25, 1905.

CASE. IV.—*Ureteral Calculus.*—Mrs. ——, white, aged 32. Admitted November 21, 1905. Patient states that at the age of 21 she had an acute attack of epigastric pain, with vomiting; this attack lasted for one or two days and was associated with severe headache. Had a similar attack six years ago, lasting three days. Patient never vomited blood, always biliary material.

Present history dates back five years, when patient began to suffer with acute pain in the left iliac region radiating to the right loin and back; pain was so acute that anodyne was used for its relief. These attacks occurred at intervals from one to two attacks each month. For one year the patient was free from these attacks.

Six weeks before admission to the hospital attacks of very acute pain, beginning in the right iliac region, radiating to the right lumbar region, occurred every day or night. Large doses of morphine were used for these attacks. Patient was never jaundiced, never noticed blood in the urine.

Upon examination, the right kidney was palpable and mov-

able; left kidney not palpable; no tenderness elicited over either right or left iliac region.

X-ray; dense shadow in region of right kidney, formed body.

Operation, November 25, 1905. Incision right flank, kidney exposed. A stone was found in the ureter. Stone was removed and the kidney, being diseased beyond operative repair, was also removed. Patient was discharged cured December 14, 1905.

CASE V.—*Calculus in Right Ureter.*—Miss ——, white. History of right renal colic for five years. Nothing of note in family or personal history other than attacks above referred to. Point of tenderness a little above the line of the right anterior superior spine of the ilium very decided; upon one occasion this tenderness suggested to the mind of the medical attendant the probability of inflammation of the appendix; this was ruled out, however. X-ray, negative.

Operation revealed a stone in the right ureter three inches below the pelvis of the ureter, with stricture of the ureter to the extent of one inch, through which it was difficult to pass the smallest probe. After incising the ureter above the stricture the stone was removed. The ureter between the stricture and the kidney was dilated to the size of the little finger. The kidney was so diseased that it was removed. The patient made an uneventful recovery. Microscopical examination of the ureter showed clearly carcinomatous change.

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[14] Metcalf and Safford. Amer. Journ. Med. Sc., 1905, i, 50.

THE TRANSPERITONEAL EXAMINATION OF THE URETER IN CASES OF SUSPECTED URETERAL CALCULUS, AND THE COMBINED INTRA- AND EXTRA-PERITONEAL URETERO-LITHOTOMY.[1]

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DURING my recent service at the Pennsylvania Hospital I had three cases which illustrate well certain advantages to be derived from the transperitoneal examination of the ureter and the necessity for a thorough palpation of the ureter when the abdomen is opened for lesions of other organs, and especially for the less acute varieties of appendicitis. Before enumerating these advantages a brief report will be made of two cases of ureteral calculus in which the stone was located by transperitoneal palpation and removed by combined intra- and extra-peritoneal uretero-lithotomy and of a third case in which ureteral calculus was suspected but not found and yet in which the real lesion, a cystic kidney, was detected.

CASE I.—An Italian, 39 years of age, male, admitted to the Pennsylvania Hospital on August 3, 1905. The patient spoke English very badly but was sent in by his physician as a case of subsiding appendicitis. He gave a history of repeated attacks of pain in the abdomen, accompanied by vomiting and diarrhœa. The attacks lasted for three or four days, when he was able to get up and go about. Until the present attack he had been well for a year. The present attack had lasted for three or four days and was accompanied by vomiting. Excepting for some slight tenderness in the right iliac fossa the patient at the time of his admission was free of symptoms. There was no tenderness over the kidney and he complained of no urinary symptoms; there con-

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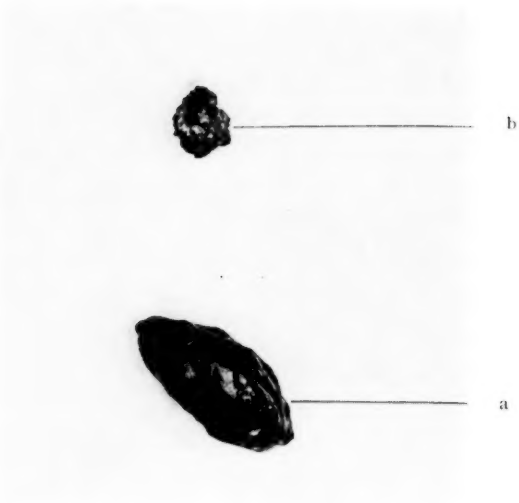


Ureteral calculi, exact size; a, Case I; b, Case II.

tinued a persistent tenderness on deep pressure in the right iliac fossa. He improved so much in a few days and the tenderness was so slight that my first inclination was to allow him to go out and return later if he had another attack. In other words, I was not prepared to accept the diagnosis of appendicitis. In view of the history, however, I concluded to operate. The patient's urine showed a number of red-blood corpuscles. Under choride of ethyl-ether narcosis I operated on the 8th of August. The abdomen was opened through the right rectus and when searching for the appendix my finger came in contact with a hard mass just below the iliac vessels in the true pelvis. It seemed about the size of a hazelnut, was very hard, and at first immovable. Although shaped like a gland it was hard and there were no other glands enlarged. As it was in the line of the ureter I concluded it was probably a ureteral stone. I left it for further investigation and proceeded to examine the appendix. This organ showed evidences of an old inflammation, the vessels over it being very tortuous and there being numerous adhesions all about it excepting at the extremity. These adhesions bled quite freely when divided. The appendix stump was crushed with forceps and inverted by a purse-string suture of gut. In order to make a more thorough examination of the small mass in the pelvis I enlarged my incision downwards through the rectus. I was then able to determine that the mass was a stone in the ureter and decided to remove it extraperitoneally without however making another incision through the abdominal wall. The original incision was further increased downwards and the peritoneum stripped from the abdominal and pelvic wall down to the ureter. With one finger in the pelvic cavity I was able to push the ureter and stone up into the extraperitoneal wound within easy reach, but not within sight. I then opened the ureter longitudinally and removed a long, black stone about the size of the end of the little finger and cucumber shaped. In order to remove the stone quite a large opening was made in the ureter. A gauze drain was then passed down to the opening in the ureter and the peritoneal cavity was tightly closed with a continuous gut suture. The upper portion of the wound in the rectus was closed with sutures through its fascia. The superficial tissues were closed excepting at the lower end of the wound, where the gauze drain made its exit. In

spite of the flow of urine through the gauze, which was quite profuse for about two weeks, the abdominal wound healed without any infection. On the 2d of September very little urine was discharged from the sinus, and on the 6th of September the sinus was closed. It opened later, however, for a short time, but closed again.

CASE II.—A domestic, aged 32, was admitted to the Pennsylvania Hospital, August 12, 1905. This patient was sent into the hospital at night as a case of appendicitis and was seen in my absence, by Dr. Francis T. Stewart. Dr. Stewart did not think the case one of appendicitis or one demanding immediate operation. I saw her the next day and could not make up my mind that there was any inflammation of the appendix. She gave a history of repeated attacks of pain in the right side of the abdomen in the appendiceal region, accompanied by vomiting. The pain was more or less fixed, there being no radiation to the back or to the bladder: there were no urinary symptoms. The examination of the urine, however, on the day after admission showed a few red-blood corpuscles and a trace of albumin. Repeated examinations of the urine continued to show red-blood corpuscles. Examination of the abdomen the day after admission showed considerable tenderness over the right kidney. This, however, disappeared and the only tenderness was in the iliac region. A few days later the patient passed both blood and mucus by the bowel and the cæcum and sigmoid were quite tender. These symptoms did not persist, as did the microscopic blood in the urine. A differential diagnosis between appendicitis, colitis, renal calculus and ureteral calculus had to be made. With the disappearance of the renal tenderness and of the blood and mucus in the bowel movements, and in view of the absence of the characteristic symptoms of appendicitis, I made a diagnosis of a probable ureteral calculus on August 30th, and advised operation. This diagnosis was based on the continued tenderness in the iliac region, the repeated attacks of pain accompanied by slight rises of temperature, and especially the microscopic blood in the urine. Urinary symptoms were absent in this case, as in the previous one; there was no frequency of micturition and no pain in the bladder. The right kidney was not movable. The menses had been irregular and painful. I determined to follow the same

technique as in the previous case, especially as I was in some doubt regarding the diagnosis. Therefore, on the 31st of August under ethyl chloride-ether anæsthesia the abdomen was opened through the outer edge of the right rectus, low down, the appendix being readily found and removed as in the previous case; it was perfectly normal. The ureter, which was thickened, was easily felt crossing the iliac vessels. About one inch below the vessels a hard, small, immovable mass was felt. The peritoneum was stripped away from the abdominal and pelvic walls after increasing the incision downwards. The ureter was exposed and brought plainly into view. Great assistance was also derived in this case from a finger within the pelvis pushing the ureter up into the extraperitoneal wound. The ureter was incised longitudinally and a small irregular stone, very rough and adherent to the ureteral mucous membrane, was removed. A gauze drain was inserted down to the ureteral wound, the peritoneal cavity was closed, and all but the lower portion of the wound in the abdominal wall. Although in this case a smaller incision in the ureter was required than in the previous one, there was a greater and more prolonged leakage of urine. The abdominal wound healed promptly excepting at the point of drainage, and the patient never had an abdominal symptom. On September 30th, one month after the operation, there was no flow of urine, there was, however, some discharge from the drainage tract which remained open for about two weeks. The patient was discharged on November 29th, the wound having remained closed for about a week.

Case III.—A man, aged 22, admitted to the Pennsylvania Hospital, December 21, 1905. This patient had been in the hospital a number of times, once for typhoid fever, again in December, 1903, for an appendiceal abscess which was operated upon by Dr. Le Conte: in February, 1904, he was again admitted suffering from attacks of pain which seemed to indicate a renal calculus. At this time Dr. Harte explored the left kidney but found no stone. Upon his last admission the patient stated that since his last operation he had had attacks of pain coming on every few weeks. The character of the pain was much the same as in his previous attacks and was accompanied by nausea and vomiting and fever. At the time of his admission he was suffering con-

siderable pain and had some temperature. This promptly subsided and he was quite comfortable the next day. When examined there was considerable tenderness in the left lower abdomen and the pain extended down to the bladder and into the left lumbar region. Later, the tenderness seemed more marked over the kidney and ureter. The tenderness over the kidney gradually disappeared but that in the left iliac region and in the course of the ureter remained. On admission there were a few red-blood corpuscles in the urine, but these were not found at any of the subsequent examinations. As the kidney had been thoroughly explored only ten months before and as the tenderness persisted over the ureter, I determined to explore this organ. As there was nothing to indicate the exact situation of the supposed stone I determined to open the abdomen as in the two previous cases and thoroughly palpate the entire urinary tract. On December 30th, under ethyl chloride-ether anæsthesia, I made an incision throught the left semilunar line into the abdominal cavity. I had no difficulty in finding the ureter and tracing it from the bladder to the kidney. It was normal in size and there was no evidence of any stone. The right ureter also could be felt in its lower portion and there was nothing abnormal about it. I had previously examined the bladder for stone with a negative result. On palpating the kidney through the wound I discovered it to be enlarged and cystic. The patient was turned on his abdomen, the kidney exposed through a straight incision in the lumbar region, and removed. During the separation of the kidney from the peritoneum I kept one hand in the abdominal wound as a guide. This greatly facilitated the separation of the kidney, which was densely adherent at its lower pole to the colon and peritoneum. The abdominal wound was closed before the nephrectomy was completed. Several of the cysts were ruptured before the kidney was delivered but not before the abdominal wound was closed. The fluid in the kidney did not have an ammoniacal odor and was of a milky consistency. The whole kidney was a mass of large cysts. The pedicle was ligated *en masse* and the individual vessels tied with smaller gut. A small drain was inserted. The patient's convalescence was perfect, excepting for a severe pneumonia which he developed promptly after the operation. It is interesting to note that this pneumonia

occurred in the right lung. A few days after the operation he was passing as much as sixty-five ounces of urine. There was no doubt from the examination of the kidney and from the character of its contents that the right kidney was secreting all the urine passed at the time the operation was done.

Palpation of the ureter through an abdominal wound is nothing new. I have for some time made it a routine procedure in all cases where the abdomen is opened for other conditions and where these conditions do not seem to be sufficient to account for all the symptoms, and I am especially careful to do this in all interval operations for appendicitis. Although never generally advocated, the immediate removal of a stone detected by palpation through the abdomen has been practiced, yet, so far as I can learn, the removal has been done through the peritoneum or through one of the various extraperitoneal incisions, such as the lumbar, iliac, inguinal, sacral, vaginal or rectal. I believe then that the practice in the two cases reported by me of the removal of the stone extraperitoneally but through the same incision in the abdominal wall, and while the abdominal wound remained open, has not before been employed. Most authorities recommend the closure of the peritoneal cavity and the making of another incision for the extraperitoneal exposure and removal of the stone. In the two cases just described there was no doubt of the great advantages to be derived from having a finger in the peritoneal cavity and on the stone during the exposure of the ureter in the extraperitoneal portion of the wound. An objection to this method which naturally presents itself is the danger of infection of the peritoneum, but in neither of my cases did this occur and if the operator hesitates to open the ureter while the peritoneal wound is still open he can easily close the latter after the thorough exposure of the ureter; he will then have had all the advantage of the finger in the abdomen during the exposure of the ureter and the location of the stone. With a certain amount of care, however, I know that infection of the peritoneal cavity can be avoided, and moreover that the exposure of the ureter and extraction

of the stone are easier and accompanied by less injury of the ureter itself when the operator has the assistance of a finger in the pelvis pushing the stone and ureter up into the extraperitoneal wound.

Another advantage to be derived from the manipulation both within and outside the peritoneum is the fact that in this way the ureteral stone can be more easily forced into the bladder if this is thought possible or back into the dilated ureter where an incision is apt to close earlier and better than at the site where the stone has been arrested. Case III illustrates the advantage of intraperitoneal examination of the ureter, even when no stone is present. It enabled me in this case to detect a cystic kidney on the left side which I would not have been able to diagnose by palpation until it had reached much greater size. In a certain number of cases of stone in the lower portion of the ureter it is difficult to determine in which ureter the stone is. In such cases localization through an abdominal incision is strongly recommended.

From the limited experience gained by these two cases I am not prepared to advise the removal of every ureteral stone by the combined intra- and extraperitoneal method, but in all doubtful cases and in all cases where a stone is found in a ureter when the abdomen has been opened for some other condition I do advocate its immediate removal either through a separate incision or after the manner just described. To remove these stones through the peritoneum is seldom justifiable, as the risks of a peritonitis are too great.

In neither of the above cases was the ureter sutured. I felt that the wound would close after simple drainage just as the common duct closes after the removal of a stone. In any future cases, however, I think I shall close the incision in the ureter and introduce a drain down to the sutures. Henry Morris states in this connection that suture of the ureter is of doubtful utility when it is much damaged and that it may be harmful.

I would urge the careful palpation of the ureter in all cases where the abdomen is opened for chronic or subacute inflammation of the appendix or uterine appendages. And also that where nephrotomy is done for stone, whether a stone is found or not, a thorough examination of the ureter, by means of a ureteral probe, should be made. One of the great objections to the use of the ureteral probe through the bladder is the difficulty of catheterizing the ureters in the male, and the further difficulty of differentiating a stone from some other form of obstruction, such as a kink or stricture. The presence of microscopic blood in urine, especially after an attack of pain, is of great diagnostic value.

THE X-RAY FINDINGS IN A CASE OF GRITTI-STOKES AMPUTATION.[1]

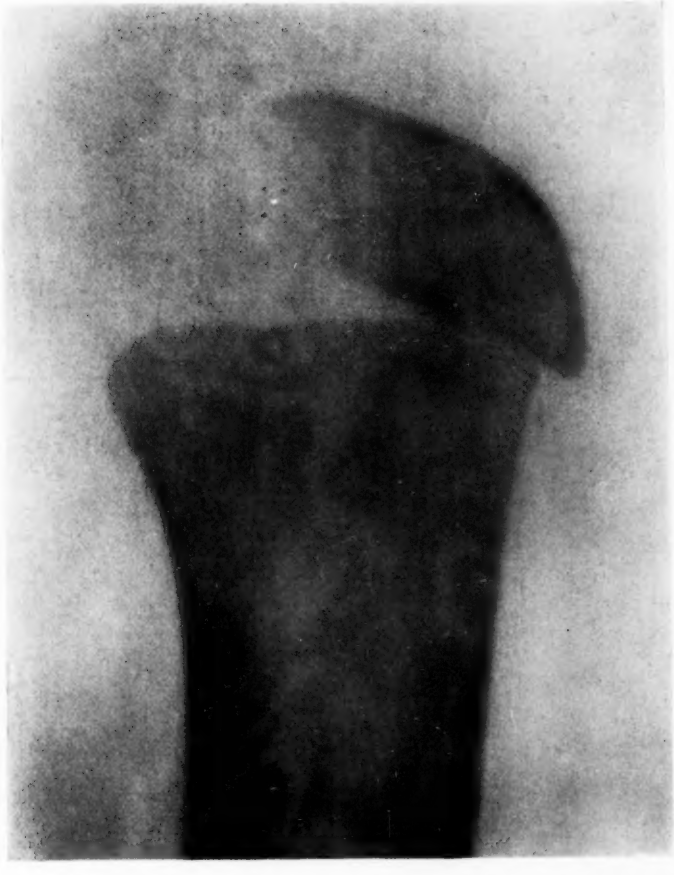
BY EUGENE R. CORSON, M.D.,

OF SAVANNAH, GA.

I AM not aware that there has been any X-ray study of the results obtained in the Gritti-Stokes amputation, with any definite information as to the ultimate relationship between the sawed patella and the lower end of the femur. Gritti's original object was to give a good bony cap to the lower end of the femur, forming a symmetrically rounded stump, well adapted to stand pressure and support an artificial limb. Gritti's original operation was a transcondyloid amputation. This was modified by Sir William Stokes to a supracondyloid amputation. He argued, and quite correctly, I think, that the transcondyloid amputation did not allow the sawed surface of the patella to be applied to the sawed femur without strain on the patella and the tendon of the quadriceps, and that contact could not be maintained without a forced adjustment, aided by pegging or nailing the bones together. If, however, the section was made a half-inch or more above the condyles, the patella could easily be applied to the sawed surface of the femur without strain and with sufficient play in the tendon of the quadriceps to overcome the contractions of this powerful muscle.

Now I believe that after the healing of the stump it may be quite difficult, if not impossible, to determine without the X-ray the exact result as to bony union between the two bones. A mere fibrous union where the stump is covered by the dense and strong fascia in this region will hold the parts so firmly together as to make any separate movements of the bones quite impossible and give the impression of osseous union. Certainly in my own case which I present here, though exam-

[1] Paper read before the Georgia Medical Society, January 24, 1906.



Rotation of patella to femur following Gritti-Stokes amputation. Profile view—patella tilted out like the half-open lid of a box.

Frontal view—patella drawn 2½ centimetres inward.

ined so soon after operation the parts seemed firmly united and gave me the impression that the patella was in place and that I should ultimately have osseous union between the two bones. The X-ray, however, showed me a quite different result.

The case in point was briefly this: A man of 62 years came to me with a carious right tibia, the result of a gun-shot injury to his leg in the battle of Fredericksburg, 41 years before. All that time he had dragged the leg about, always getting worse, until finally in despair he realized the necessity of an amputation. At operation the whole tibia was found to be diseased, and I made a supracondyloid amputation with a long anterior flap, applying the sawed under-surface of the patella to the sawed femur. There was no strain on the tendon of the quadriceps. and the sawed surfaces were easily brought in contact and held by a snug sewing of the fascia and tendons with chromicized gut. The stump healed in two weeks without pus. This operation gives a beautiful, symmetrical stump, with the line of union of the flaps posterior, and looking as though "born that way."

Now my X-ray shows that I failed to hold the patella in place, and that through the strong action of the powerful thigh muscle, it had been drawn two and a-half centimetres inwards, and in addition had been tilted up like the half-open lid of a box, producing the very results that Stokes had tried to overcome by his supracondyloid modification. Judging from the skiagraph I have not got a very symmetrical stump, but the external appearances do not show this displacement; the stump looks symmetrical and firm. Though the skiagraph was taken just before the patient left the hospital, too soon for complete bony union had the bones held their position, we can see at any rate the displacement of the patella through the strong action of the quadriceps femoris, and know positively that no bony union is possible.

The X-ray findings in this case have suggested to me the following points for consideration:

Is it desirable to get a bony union between the patella and femur if we have otherwise a symmetrical, well-shaped stump?

I am inclined to believe that a fibrous union with the patella well in place and acting as a sort of buffer is preferable to a bony union where it forms a mere bony knob to the femur. I cannot but believe, too, that unless the patella is held in place by nail or peg, a mere fibrous union is the rule and the osseous union the rare exception. With this belief and knowing the excellent results following this amputation, I should discard all radical efforts to obtain bony union. Really the retention of the patella in the anterior flap is desirable quite aside from its forming a bony cap to the end of the femur. It gives a body to the flap, which, with the strong fascia of the knee, aids in forming an admirable cover to the end of the femur and in the making of a symmetrical stump. Compare this flap with the ordinary skin-flap of the Cardan operation and its superiority becomes at once apparent.

Our efforts should be more towards keeping the patella in the midline than towards obtaining bony union. Kept in the midline, it acts as a buffer to the end of the femur, as well as a good bony pad to a stump in every way adapted to hold the artificial limb and to bear the weight of the body.

This operation has several good points to recommend it. The section is through a spongy bone which heals rapidly, and the medullary canal is not opened. The avoidance of the femoral muscles in cutting out the posterior flap, the tendons alone being cut which retract and obviate any further retraction of the tissues in the healing of the stump. And, finally, there are fewer vessels cut, the popliteal and some articular branches alone requiring ligature.

EPIPHYSEAL SEPARATION OF THE GREAT TROCHANTER, WITH REPORT OF A CASE.[1]

BY C. O. THIENHAUS, M.D.,

OF MILWAUKEE, WIS.

EPIPHYSEAL separation of the great trochanter is of such rare occurrence, and at the same time seems to be so dangerous and serious an injury, that the contribution of every case is well worthy of consideration. Therefore the recording of the following case observed by the author seems amply justified:

Miss K., of Union Grove, Wis., aged 11, states that one afternoon in February, 1904, while leaving school, she was violently thrown down on the floor by a school-mate, who pushed unexpectedly from behind. During her fall she struck heavily upon her left hip. Although she felt considerable pain in the region of her left trochanter after the accident, she was able to limp home, a distance of about one mile. The following morning she was unable to arise from her bed, as every attempt to step on the left leg caused her great pain originating in the region of the left trochanter major and extending down to the knee. The physician who was called, made the diagnosis of contusion of the hip joint, and advised rest in bed for several days. Four weeks after the accident I saw the case in consultation with Dr. McCracken, of Union Grove, when the patient presented the following status:

The girl while lying in bed could move her affected leg in all directions without discomfort. Upon pressure, however, on the region of the great trochanter of her left leg, she experienced considerable pain. Passive motion of the leg did not reveal any abnormalities in the hip joint. When I asked the patient to get up and use her leg she was unable to do so, stating that it was impossible to step on the leg on account of pain originating in the region of the great trochanter, and extending to the inner side of

[1] Demonstrated before the Surgical Section of the American Medical Association, 1905.

her keee. While standing she was always inclined to rotate the leg inward and to hold it in a slightly flexed position as shown in figure 1. Not being able to reach any definite diagnosis I advised the taking of a Röntgenogram. This, as shown on plate No. 2, demonstrates that the patient was suffering from an incomplete separation of the epiphysis of the great trochanter. A small piece of bone seems to have been torn off from the lower portion of the trochanter.

A well-padded plaster bandage was then applied, with slight pressure on the trochanter. After absolute rest in bed for six weeks the bandage was removed, and active and passive motion begun cautiously and slowly. Complete recovery followed.

From a clinical standpoint epiphyseal separation of the great trochanter, usually occurring between the ages of 7–17 years, must be divided into two classes. First, those in which a complete separation of the epiphysis, including the periosteum and tendinous parts attached to the great trochanter, has taken place. This class seems to be most dangerous and oftentimes fatal. Second, those in which the great trochanter is separated from the body and neck of the bone, but no tearing of the periosteum and the tendinous portions has taken place. The author's case belongs to the second class.

The cause of the separation in our case was, as cited in most cases, direct violence to the trochanter by the fall upon the hip. Separation of the trochanter produced by traction of the muscles attached to the trochanter seems to be possible, but there is no certain case on record belonging to this class. Broca, in an article entitled "Mécanisme des décollements epiphysaires" (Presse médicale, Paris, March 4, 1905), coming to speak of the epiphyseal separations of the upper femur, says: "Pour les deux trochanters, l'arrachement musculaire est parfaitement possible, mais je n'en connais pas d'example."

On the great trochanter are inserted among other muscles the powerful gluteus medius and minimus muscles. The action of these muscles produced the pain in our patient by tearing

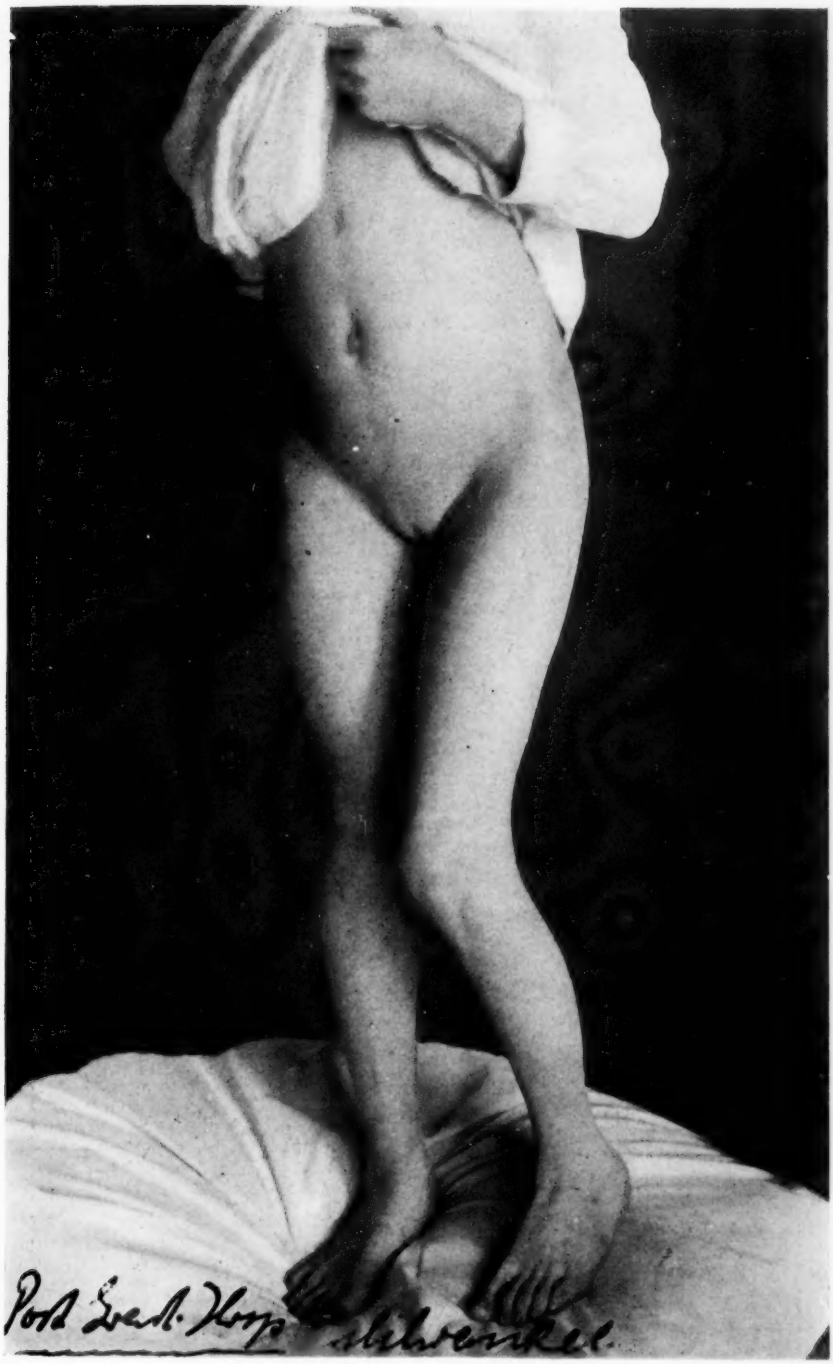


FIG. 1.—Epiphyseal separation of great trochanter. Op. Feb. 1904.

FIG. 2.—Lateral view two months after injury. (Note—The spots are plate defects.)

on the loosened trochanter during every attempt to step on the leg. Had there been forcible and excessive either active or passive motion immediately following the accident, these muscles would probably have succeeded in tearing off the trochanter entirely, thereby transforming the incomplete into a complete separation, and endangering the life of the patient.

John Poland (London), to whose excellent work on "Traumatic Separation of the Epiphyses," London, 1898, I owe most of my information and literature on the subject, could only collect 12 cases of epiphyseal separation of the great trochanter up to 1898. He cites, page 671, that from these 12 cases only 2, in which the condition was diagnosed during life, recovered. Of 6 cases 5 died from rapidly-developing suppuration and pyemia a few days following the accident. Death from other injuries resulted in 3 out of 12 cases.

The question naturally arises: Why is it that this injury is so fatal, and what are the reasons that at this place so much oftener suppurative processes take place after an epiphyseal separation than on other epiphyses of the body? In regard to this question, I would like to quote the opinion of Hamilton (*vide* Poland: "Traumatic Separation of the Epiphyses," p. 672), who says: "The cases reported would seem to show that in epiphyseal separation of this process there is a peculiar tendency to the formation of pus and of general pyemic infection, which may perhaps find its explanation in the great vascularity of the bony structure at this point, and in the fact that the lesion of this spongy tissue especially exposes the patient to the absorption of the septic materials."

To this Poland adds that "This cancellous tissue forming the base of the trochanter, which is in reality an apophysis, is certainly of a lighter and more spongy character than that in contact with the true epiphyses of the long bones. A considerable area of such structure is involved in this injury."

Since the review and collection of literature on this subject up to 1898 by Poland, I am unable to find another case cited.

In regard to diagnosis and treatment of epiphyseal separa-

tion of the great trochanter, it is not my intention here to dwell at length upon this subject, suffice it to again call the attention of the reader to the essay of this subject by Poland, in his work, "Traumatic Separation of the Epiphyses." For the purpose of completeness however, I may be allowed to give the following brief summary:

Diagnosis.—The differential diagnosis between contusion of the trochanter major and epiphyseal separation without displacement of the trochanter is almost impossible because of the insignificance of local symptoms, but let us bear in mind that in every case of direct violence against the trochanter, such as fall on the hip or severe blow on the trochanter, in young people from the seventh to the eighteenth year, the possibility of separation of the great trochanter must be taken into consideration. When we find at the same time pain by pressure on the region of the trochanter and inability of the patient to use the limb because of pain in the region of the hip joint extending down to the knee during attempts to walk, while at the same time active and passive motion in the hip joint is possible to all directions, the possibility of a separation of the great trochanter is still more probable. In such cases the physician should not be satisfied with the diagnosis of contusion of the hip joint, but an immediate skiagram should be taken to clear the diagnosis.

Even in case of complete separation of the trochanter with displacement, it is oftentimes impossible to feel the detached trochanter, displaced backwards, and upwards, on account of the accompanying swelling. The only definite means of a positive diagnosis even for those cases is a Röntgen Ray picture.

Treatment.—In every case in which there is any suspicion of epiphyseal separation of the great trochanter, absolute rest in bed is imperative, and in examining such cases for diagnosis the patient should be handled with the utmost care, especially avoiding forcible active and passive motions, which by the friction of the separated portions may produce suppuration and transform an incomplete into a complete separation.

When an incomplete separation has been diagnosed by the Roentgen Ray, a carefully applied plaster-of-paris cast, well padded with cotton, should be adjusted, enclosing the entire leg as well as the pelvis. The patient must stay in bed with this plaster cast six to eight weeks.

In cases of complete separation, I would not be inclined to conservative inoperative treatment on account of the great difficulty of keeping the trochanter in place, but would advise immediate operation and suturing of the great trochanter to its place. In case inflammation and suppuration sets in, the trochanter should be immediately removed and the parts incised freely for the purpose of establishing free drainage.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, February 14, 1906.

The President, Dr. George Woolsey, in the Chair.

PYLORIC OBSTRUCTION.

Dr. Willy Meyer presented a man, 33 years old, who had been operated on in Berlin, in 1902, for benign stricture of the pylorus, the operation done being a gastroenterostomy, combined with an enteroenterostomy.

When the patient was admitted to the German Hospital, in October, 1905, he complained of symptoms which indicated that the pyloric obstruction had recurred. They were not urgent, however, and before reopening the abdomen it was decided to write to Berlin and learn exactly what had been done at the previous operation. While awaiting an answer, the patient's symptoms became more acute; he vomited more or less continuously, especially after taking food, and upon examination it was found that the vomitus contained material that had been acted upon in the jejunum. Lavage of the stomach was immediately begun, and in the meanwhile a letter was received from Berlin which contained the information that on November 24, 1902, the patient's abdomen had been opened for the relief of a benign obstruction of the pylorus, and that at the time of the operation, which consisted of a combined anterior gastro- and enterostomy, gastric ulcerations were found which had extended into the head of the pancreas. A very long, irregularly-curved scar indicated the site of the previous operation.

On examination by Dr. Meyer a distinct splashing sound was made out, evidently within the stomach, and a second similar sound in the left inguinal region, and percussion produced a vermicular contraction of the intestine within. Upon exposing the stomach, by a straight abdominal incision, many adhesions were found as the result of the previous operation. After separating the omentum, it was observed that the efferent portion of the gut was tightly adherent to the abdominal parietes, and within its lumen a small foreign body could be felt. This subsequently proved to be a buried wire suture, the curved end of which was imbedded in the intestinal wall, which it had almost perforated. Upon investigation, it was found that the gastroenterostomy opening had contracted, so that it would scarcely admit the tip of the small finger. The enteroenterostomy had been done very close to the gastroenterostomy. The proximal loop, which had to pass across and over omentum and transverse colon, was long and hung loosely downward into the small pelvis. It was very much distended. From the pelvis it rose up perpendicularly to the stomach. This was probably the cause of the regurgitation of food from the jejunum into the stomach, as it followed the course of least resistance, the enteroenterostomy being placed so close to the stomach, that it could be but of little use.

After proper separation the gut was cut loose from the stomach, the hole in the latter closed by a double row of silk-sutures and that in the gut transversely, to avoid stricture. Before suturing the gut, the foreign body was extracted. Then a posterior gastroenterostomy of good length was done by the elastic ligature method, and the patient made a good recovery. He was entirely relieved of his symptoms, and had gained over thirty pounds in weight since the operation.

SPLENECTOMY FOR SARCOMA.

Dr. Willy Meyer presented a man of 30 who was referred to the surgical division of the German Hospital on account of the presence of a tumor of the spleen, which had grown rather rapidly, and showed signs of malignancy. It was easily palpable, and presented a nodular surface. There were no evidences of free fluid in the abdominal cavity, and yet the comparative

cachexia of the man made it probable that the growth was malignant in character.

Operation, December 18, 1905. After extirpating the umbilicus, the abdominal wall was freely incised, and a large quantity of serosanguinous fluid oozed out. Upon pushing aside the omentum, the spleen came into view. It was plainly the seat of a malignant growth, apparently secondary to embolic infection, although no other organ appeared to be involved. Upon attempting to remove the organ, dense adhesions to the omentum and diaphragm were met with, and in order to gain freer access to the vault of the latter, it was decided to make an osteoplastic flap of the costal arch. This was done by extending the incision upward, stripping off the thoracic muscles, then dividing the costal cartilages next to the sternum and ribs and turning up the flap. The field of operation was now in plain view, so that the adhesions in the vault of the diaphragm could be divided between two ligatures without any difficulty. After this it was found that the splenic tumor was adherent to the pancreas, and it was necessary to surround it with a ligature between the middle and proximal thirds, and remove a large section of it together with the spleen. The retro-peritoneal glands were also much infiltrated, and had to be removed.

After extirpation of the growth, the large cavity that remained was filled with sterile gauze. Miculicz tampon. The man made a good recovery, and had enjoyed fair health since, although there were already evidences of further metastases in the abdomen. The growth proved to be a round-celled sarcoma. The infection had apparently been carried to the spleen from the retroperitoneal glands by way of the splenic artery, which later had become obliterated.

METHODS OF RADICAL CURE OF UMBILICAL AND VENTRAL HERNIÆ.

Dr. George Stewart read a paper with the above title.

Dr. Joseph A. Blake said he had operated on a number of cases of umbilical hernia, and five years ago at the Academy he had read a paper in favor of the overlapping method from side

to side. He would divide umbilical herniæ into two classes,—namely, those with diastasis of the recti muscles, and those in which this separation was absent. In the cases with diastasis in whom the abdominal parietes were much relaxed, he still favored the side-to-side overlapping method. He had operated on twenty-one cases by that method, eighteen for umbilical and postoperative ventral hernia with one small recurrence in a case of ventral hernia, and three for diastasis alone. In other cases, in which there was little or no diastasis of the recti muscles, he considered the overlapping method from above downward as preferable to the side-to-side plan, for the reason that it could be done more quickly and with less shock. This operation required a smaller incision than the other, and recovery from it was usually prompt. Furthermore, if it became necessary to sit the patients up in bed to relieve the breathing, the tension on the wound would also be relieved by the flexion of the body. In cases where the diastasis of the muscles was not pronounced, side-to-side overlapping would encroach on the intra-abdominal space too much, and interfere with breathing.

In his method of operating on these cases, Dr. Blake said, he simply overlapped the entire thickness of the abdominal wall (excepting the skin and subcutaneous fat) without any attempt to suture it layer by layer. One objection to the plastic operation was that the tissues were deprived of their nutrition, and one might as well use foreign material as autoplastic material that had been cut off from its nutrition. In the vertical overlapping operation the patients usually made a very smooth recovery. The transverse incision was carried to just inside the sheaths of the recti, then the recti were pulled aside a little, and the entire thickness of the abdominal wall was overlapped and sutured. No attempt was made to suture the peritoneum separately.

Dr. Willy Meyer said he had operated on these cases by both the vertical and transverse methods, and had also frequently resorted to heteroplasty, using the silver-wire filigree. He recalled one case in which he had employed the side-to-side overlapping method, which had impressed him with the fact that great care should be exercised in loosening the recti from their sheaths. The case was that of a very heavy woman, with a large ventral

hernia, and on attempting to bring the recti together, it was necessary to lossen them from their sheaths. A perfect cure resulted, but a year later the woman returned with a rather annoying hernia at the outer border of one rectal sheath, where the muscle had been loosened. There was no tissue with which this gap could be filled, and silver-wire netting was thereupon inserted, which resulted in a complete cure.

The speaker said that while the overlapping method of treating this condition was an excellent one, there were a certain number of cases, especially of recurrent abdominal herniæ, where it was not practicable on account of lack of material, and in such cases the use of silver wire or of wire filigree was necessary. A review of his records showed that he had done this kind of heteroplasty fifteen times on fourteen cases with 3 failures and twelve complete cures. The case where a second operation became necessary was that of a woman weighing 250 pounds, who had a very large ventral hernia, which was successfully closed with silver-wire filigree. Subsequently, she sustained an injury, and partial recurrence, and upon reopening the abdomen it was found that the intestines had escaped through a perforation in the wire netting. More of the silver wire was inserted, and there had been no further recurrence since the operation, which was done five years ago. The speaker said he had seen tremendous herniæ which there would have been no chance of curing without resorting to heteroplasty. He emphasized the fact that every kind of ventral hernia could be cured, either by the autoplastic methods, which were the best if they were feasible; if not, one should not hesitate to use the silver-wire filigree. A number of his cases in which he had employed the latter method remained absolutely cured after three years. Of course undisturbed, aseptic wound-healing was an absolute requirement of success.

Dr. Stewart, in closing, said that while the statement made by Dr. Blake that the tendons, deprived of their nutrition, were apparently foreign bodies, practically that did not seem to be the case. He had no explanation to offer as to what became of them, unless it was that they still retained their vascularity. Personally, Dr. Stewart said, he had had no experience with heteroplasty. While he believed there were cases in which it had to be resorted

to, he thought they were very few. It was in the very large herniæ especially that the abdominal wall was lengthened, and that overlapping was possible. The insertion of silver-wire filigree into the abdomen had in some instances given rise to trouble.

Dr. Stewart said he could not speak regarding the permanency of the cure in his cases, as they were all still comparatively recent.

CONGENITAL STENOSIS OF THE PYLORUS.

Dr. John Rogers showed a specimen removed from the body of a child born on November 13, 1905. There were no symptoms for several weeks after birth; then the usual signs of congenital pyloric stenosis developed, and an operation for its relief was done on January 27, 1906. The stomach had a capacity of about three ounces, and the pylorus was represented by a dense fibrous ring of pale color and feeling like cartilage and about the size of the end of the little finger, and was apparently completely closed. A posterior gastroenterostomy by the suture method was done, close to the duodenojejunal fold.

For the first week after the operation, the convalescence was apparently favorable. Then there was a rise of temperature, and upon inspection, a knuckle of intestine was found protruding from the abdominal wound. This was replaced, and the wound again sutured. Union again failed to occur and the child died a week later. At autopsy there was found a low grade of adhesive peritonitis binding together the coils of intestine around and to the margins of the wound (the silk stitches had "cut through"). There was no pus. The rest of the abdominal cavity was normal. The gastroenterostomy wound had united perfectly and the fistula would admit a No. 20 F. sound with ease. The stomach had contracted to a capacity of about half an ounce. The pylorus was about double the size which had been noted two weeks before at operation and was softer. The lumen was found to be patent and capable of admitting about a No. 15 F. sound. On cross section the pyloric wall was about ⅜ of an inch thick and this apparently consisted chiefly of œdematous muscle. The microscopic examination will be completed later and announced at another meeting. The remarkable fact about the specimen is

that the pylorus was closed at the time of operation and yet became patent within the next two weeks.

DR BLAKE referred to a case of what appeared to be spasmodic stricture of the pylorus in a child five years old, in which the symptoms dated back three years. At times, no food would seem to be able to pass through the pylorus; at other times the child was comparatively free from trouble. A Finney operation was done, which relieved the symptoms. The pylorus was apparently hypertrophied.

MECKEL'S DIVERTICULUM FILLED WITH SEEDS.

DR. GEORGE WOOLSEY showed a specimen, removed from a woman in the course of an operation for extirpation of the uterus and adnexa for malignant adenoma.

While inserting a pad into the abdomen, he came into contact with a pear-shaped body, about two and a-half inches long, which seemed to be filled with solid contents. To the touch, it resembled the gizzard of a chicken filled with small pebbles. It was located about eighteen inches from the cæcum, and proved to be a Meckel's diverticulum. It contained several hundreds of dark-colored small, round and oval bodies, most of which gave a facetted appearance. These were at first sight regarded as tiny gall-stones, so they were sent to the pathologists, who reported that some of them were grape-seeds, but that most of them were tomato-seeds with a number of raspberry and other seeds. The sac contained no fecal matter; nothing but these seeds.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated meeting held February 5, 1906.

The President, JOHN B. ROBERTS, M.D., in the chair.

MODIFIED MÜLLER OPERATION FOR FLAT FOOT.

DR. H. AUGUSTUS WILSON presented a man upon whom he and Dr. R. V. Patterson had performed the combined operation of arthrodesis of the astragalo-scaphoid joint and transplantation of the tendon of the extensor proprius hallucis for the relief of flat foot, a modification of the operation originally described by Dr. Ernest Müller,[1]

Müller's operation consisted in using the tendon of the anterior tibial muscle, which he detaches from its insertion and passes through a hole drilled vertically through the scaphoid and attaches the tendon to the inferior-internal surface of the scaphoid, and divides the tendo achillis.

The operation as performed upon the patient shown was done in November, 1904, at the Philadelphia Hospital. The technique has been fully described.[2] Instead of using the anterior tibial tendon as Müller did, the tendon of the extensor proprius hallucis was taken. The hole through the scaphoid was made as by Müller. In addition to the tendon transplantation an arthrodesis was performed on the astragalo-scaphoid articulation.

Plaster-of-Paris fixation in the extreme over corrected position was maintained for four weeks. Carefully applied physical

[1] Centralblatt f. Chirurgie, Jan. 10, 1903, p. 40.
[2] American Medicine, May 6, 1905, p. 725.

culture soon brought the muscles into function in their new relations, and enabled the patient to control the action of his feet involuntarily. The loss of the extensor proprius hallucis in its former and normal position was very apparent at first, as the patient had toe drop. This was gradually overcome as the extensor brevis digitorum became developed in the assumption of its newly-acquired function.

The best evidence of the full success of the operation on the patient is the fact that during the year since the operation he has been engaged in hard work without inconvenience. He had been enabled to work full time without pain, which was impossible before the operation was done. As a preliminary to operative correction it is essential that the feet should be freed from all restraint of full free motion, as it is apparent that the presence of any restraint will interfere with muscular development. The necessary amount of free motion can be secured by the employment of the mechanical arch-producer devised by Dr. Wilson.

Dr. James K. Young said he had for several years employed in the treatment of flat foot the mechanical arch-producer devised by Dr. Wilson and found that it gave very good results. He generally applies the instrument after baking the foot for some time. This makes the parts more pliable and a greater degree of correction may be obtained at each sitting.

ABSCESS OF THE ABDOMINAL WALL COMMUNICATING WITH THE BLADDER WHICH CONTAINED A CALCULUS.

Dr. Joseph M. Spellissy related the history of a boy, eighteen years of age, who was admitted to the Methodist Episcopal Hospital on February 12, 1901. He had enjoyed perfect health till his sixteenth year. He then began to suffer with pain during urination and also and more particularly at the end of the act, when he passed pus. Occasional distress from retention of urine was relieved by catheterization. His condition sometimes kept him in bed and once he suffered for a week with œdema of the foot. During the three months prior to admission his abdomen had become swollen in the median line and he passed a small urinary calculus per meatum.

On admission, a reddened, elevated, tense inflammatory mass,

shaped like an enlarged uterus, occupied the middle of the abdominal wall from just below the umbilicus to just above the pubes, and seemed on the point of rupture. (Fig 1.)

Under ether anæsthesia, the passage of a sound confirmed the suspicion of the presence of a vesical calculus; two incisions, one in the lower and one in the upper part of the abdominal mass, liberated a free amount of pus from apparently independent cavities in the abdominal wall. But a third incision, joining the other two, not only discovered a sinus uniting them but also a fistulous passage communicating with an indurated, thickened, suppurating bladder contracted on a roughened calculus, (Fig. 2) measuring 2¼xIx¾ inches. The spontaneous effort of this calculus to deliver itself through a suprapubic abscess of the abdominal wall was assisted by incision, through which the calculus was removed. A catheter was inserted into the bladder per urethram, and both bladder and abscess walls were scrubbed with gauze and irrigated. Convalescence with suprapubic and urethral drainage terminated in an uneventful recovery with all sinuses closed in three months.

INFLAMMATORY MASS IN THE RIGHT ILIAC FOSSA CONTAINING AN ENTEROLITH THE NUCLEUS OF WHICH WAS A PIN, AND LATER DISCOVERED TO COMMUNICATE WITH THE APPENDIX.

Dr. Spellissy also related the history of a man forty years of age who was admitted to St. Joseph's Hospital, complaining of a dense mass immediately internal to and apparently continuous with the anterior border of the right iliac bone, and extending from its anterior superior spine down to its junction with the pubis. He associated the origin and duration of this mass with an irreducible inguinal hernia existent for fifteen years.

Under ether anæsthesia, with the assistance of Dr. G. G. Davis, on April 11, 1903, an incision close to the margin of the right iliac bone, close to and below its anterior superior spine, passed through a most dense, apparently fibrous mass about three-quarters of an inch thick. Through this capsule an extraperitoneal space below the ileopectineal line was reached by blunt dissection and a hard fusiform body found within it. On extraction the body proved to be an enterolith, which on incision was

found to contain a pin as its nucleus. (Fig. 3.) Nothing else was found in the cavity, which seemed to be a blind pocket, but it diffused a fecal odor. It was, therefore, drained and but partially closed. Within a week after the incision, a fecal fistula developed in the wound and persisted till the patient, without warning, disappeared from the hospital; and was still present when he was readmitted, five months later, during the service of Dr. G. G. Davis.

Operation under ether anæsthesia by Dr. G. G. Davis, on September 23, 1903, found the fistula to communicate with the appendix. Both fistulous tract and appendix were excised, and the patient was discharged cured three months later.

AN INGUINAL ABSCESS SIMULATING HERNIA.

Dr. Spellissy presented a man, twenty-three years of age, an inmate of the Pennsylvania Training School for Feeble-Minded Children at Elwyn, who began three years ago to have in the right groin a small walnut-sized reducible mass, supposed to be an inguinal hernia. The subsequent growth of this mass was concealed by the patient until it was brought to the attention of the resident physician on November 25, 1905, when the condition illustrated in Fig. 4 was discovered and operation for strangulated inguinal hernia requested.

Examination showed an irreducible, untympanitic, painless mass (Fig. 4.) with inflammatory pointing at a nodular apex coincident with an abdominal mass in the right iliac fossa, and a practically normal degree of temperature and rate of pulse and respiration. The patient's spine was undeformed, painless, and flexible. Diagnosis of iliac abscess gravitating to the thigh was made and interference postponed to the following day, that a long director for a counter opening might be obtained.

Under ether anæsthesia the inguinal abscess was incised, curetted, and drained with an evacuation of three to four pints of pus. The crural canal, however, was found impassable and there was no communication with the abdomen; the abdominal mass persisted and pressure upon it elicited no change in its bulk and brought no new pus into the inguinal wound. Exploratory incision for the removal of this mass is reserved for another occasion, and the diagnosis is now revised to inguinal abscess coincident with an independent abdominal mass.

FIG. 1.—Abscess of the abdominal wall communicating with the bladder containing a calculus.

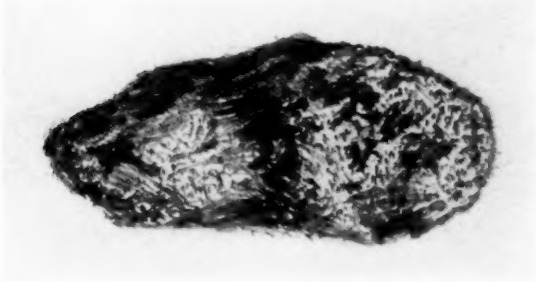


FIG. 2.—The calculus of Case I, actual size.

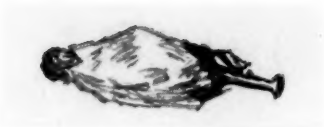


FIG. 3.—Actual size of enterolith encrusted upon a pin; when first removed the enterolith completely enveloped the pin.

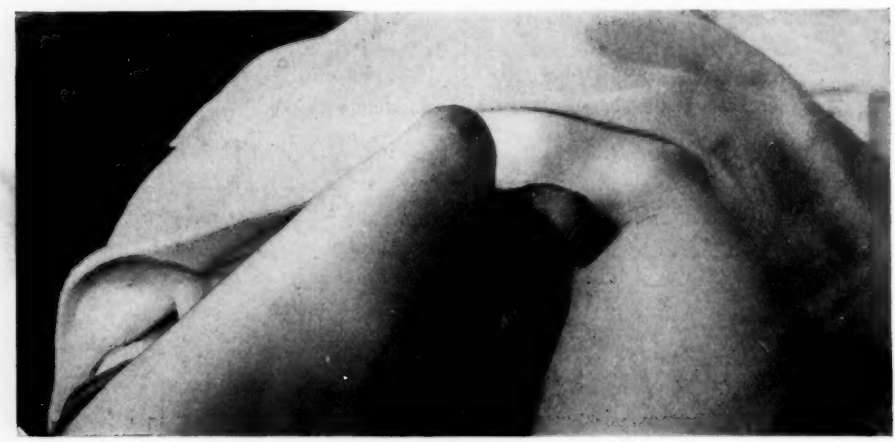


FIG. 4.—Inguinal abscess simulating hernia.

PERI-ŒSOPHAGEAL ABSCESS CONTAINING A SWALLOWED FOREIGN BODY.

Dr. Spellissy related the following case: A freight conductor aged forty-four years was admitted to St. Joseph's Hospital with a large mass occupying the left side and median line of the neck, the thyroid cartilage being pushed to the right side. The mass did not fluctuate, the tongue was furred, and the pharynx was inflamed but neither it or the larynx, according to the report of Dr. G. Marshall, exhibited any marked abnormality.

The patient attributed his condition to the forcible swallowing of a piece of bacon, caused by a violent jolt while breakfasting, seven days before, in the caboose of a freight train that had stopped so suddenly as to throw the patient forward three feet. Efforts by the finger to recover the bacon were unsuccessful. Faucial distress was immediate, and reached such a degree by afternoon, that the patient went home to bed and remained there until his admission to hospital. During the interval he was subject to chills, fever, occasional delirium, and the gradual growth of the mass. The presence of any abnormality of the neck prior to the accident was denied.

An exploratory incision of three inches along the anterior border of the sternocleidomastoid, under ether anæsthesia and with the patient in the Trendelenburg position, discovered a prominent thyroid. Hypodermic exploration of this gland being negative, its outer border was freed, the gland retracted inward and the dissection carried down to the vertebræ beside the œsophagus. Escape of foul pus into the pharynx and the wound was coincident with the disappearance of the mass and the discovery in the abscess cavity of a piece of bone, first thought to be the patient's hyoid but later found to be removable, to be foreign, and to measure $1\frac{1}{3} \times \frac{1}{2} \times \frac{1}{16}$ inches. Partial closure of the wound with drainage was followed by recovery without a fistula in forty-six days Return of the patient for œsophageal bougieing was advised.

Dr. John H. Gibson was reminded by Dr. Spellissy's third case of a patient seen at the dispensary of the Jefferson Hospital while he was chief of clinic. The man brought an indignant note from his physician who said he sent the patient to a truss-maker and the latter had returned him with the statement that he had

no hernia. Examination showed an iliac abscess which had come down on the sheath of the iliac muscle beneath Poupart's ligament. The mass disappeared when the man lay down, there was impulse on coughing and hence the swelling showed some of the signs of a femoral hernia. It was external to the vessels, however, and easily shown to be an abscess. There was no rigidity of the spine, as the abscess was iliac instead of psoas in type. The man was operated on and made a good recovery.

VICIOUS CIRCLE AFTER GASTRO-ENTEROSTOMY.

Dr. John H. Jopson reported the history of the following case: An adult woman had suffered for more than a year with symptoms of chronic gastric ulcer, including prolonged and obstinate vomiting, sometimes containing fresh, sometimes altered blood, without any excessive hemorrhages at any one time, and an inability to retain anything but liquid diet. In the feces the occult-blood test was positive. Then solid food was attempted. The disease had resisted prolonged and careful medical treatment including confinement to bed for about nine months out of twelve. At the time of operation she was a chronic invalid, rather neurasthenic, thin, and somewhat anæmic.

Operation, November 15, 1905, Dr. Willard assisting. The stomach was dilated and somewhat lower than normal. Rapid scrutiny showed no external evidence of ulcer or cicatrix. A posterior gastroenterostomy was performed by the aid of the Moynihan clamps. The opening in the bowel was made 4 or 5 inches below the duodeno-jejunal angle, and in the stomach at the most dependent point of the greater curvature. At its conclusion the edges of the opening in the transverse mesocolon were sutured to the jejunum beyond the anastomosis by three stitches, one median, and one to either side. After the left-hand stitch was placed it was casually noted that there was slight puckering of the bowel at this point. The operation was otherwise completed in the usual manner.

Following the operation the patient vomited occasionally for two days, after which nausea and vomiting became less frequent, and finally practically ceased. Six days after the operation (November 21) the vicious circle was rather suddenly established, and the patient began to bring up large quantities of dark green

bilious material. The vomiting resisted all the usual treatment and persisted during the following day. On the 23d it became frequent, and the patient's general condition, heretofore good, at the end of the day became suddenly much worse. There was a rapid rise of pulse rate in a few hours from 100 to 140, and it was evident that unless prompt relief was afforded the patient would succumb. She was re-operated at midnight, November 23. The abdomen was reopened through the primary incision, the abdominal cavity found clean, and sharp angulation of the gut at the site of the gastroenterostomy was found as the cause of the symptoms. There were slight fresh adhesions between the adjacent surfaces of the two limbs of the spur. There was firm union of the opening in the mesocolon to the bowel, the edges of the opening thickened and apparently contracting around it, causing acute and absolute obstruction of the flow from the proximal to the distal limb. The adhesions were separated, the bowel straightened itself out, and the proximal loop emptied itself.

There seemed to be an improvement in the general condition of the patient dating from this time, which permitted the operation, heretofore a hurried and anxious one, to be finished more deliberately. The choice of treatment lay between freeing the mesocolon from the bowel and re-suturing it to the posterior wall of the stomach, and an anastomosis between the two limbs of the potential spur. The latter method was decided upon, and a medium-sized Murphy button was introduced as far away from the anastomosis as the short proximal limb permitted. The button was reinforced anteriorly by a Cushing suture. After operation the improvement in the general condition was prompt and gratifying. Vomiting was not checked at once but was less in amount. Retching was for a time a frequent and distressing symptom. One week after the second operation she was retaining her nourishment fairly well, nourishment being still liquid, and only vomiting occasionally. Two weeks after operation vomiting had practically ceased. The button was passed on the nineteenth day. Since convalescence has been established she has gained rapidly in weight, is free from gastric symptoms, and enjoys a liberal diet.

Moynihan emphasizes as one of the eight important points in his method of gastroenterostomy the suturing of the transverse

mesocolon to the jejunum. His remarkable record of successes and the freedom of his patients from regurgitant vomiting after operation would seem to be good proof that there is no flaw in his technique in this direction, and I can only attribute the result in this case to the fact that one or both of the lateral stitches were probably placed too far from the anastomosis. If this were the case then any separation of mesocolon from the thin wall of stomach would tend to drag together the proximal and distal portions of the jejunum, as would also any contracture of the opening in the mesocolon. Moynihan says the stitches should be placed just outside the line of anastomosis. The accident which occurred in this case serves to emphasize the necessity of care in the least and most minute details; at the same time it may be questioned whether, theoretically, at least, the same contracture might not occur at a later period, no matter what precaution in this respect was observed and Moynihan refers to a case operated by Czerny and reported by Stendel in which obstruction of the efferent loop had been so caused. If as there seems to be in these cases, and as Deaver emphasizes there is a tendency for the opening in the mesocolon to contract and become tough and cicatricial. it may in time cause an obstruction to the intestinal flow at the anastomotic site. Deaver, in speaking of the measures necessary to prevent hernia of the gut through the mesocolon says: "To obviate the occurrence of this complication most surgeons have adopted the precaution of stitching the edges of the opening in the mesocolon to the stomach. Mr. Moynihan, on the contrary, advises stitching it to the jejunal loop below the anastomosis. I cannot approve of this modification of the usual technique. Mr. Moynihan does not give any reason for this preference, and to my mind no good reasons exist. By suturing the mesocolon edges to the stomach we in the first place close the opening into the lesser peritoneal cavity; this is the most important function of the procedure. But in addition to this we are sure the gastric opening being the lowest portion of the stomach, as the mesocolon draws the stomach down into a funnel-shaped depression, and we moreover avoid any possible constriction of either loop of the jejunum. That this last is an important feature of the operation, I think, cannot be denied. Probably every surgeon has seen cases where the opening in the transverse mesocolon, not

having been sutured to the stomach, contracted, and, becoming quite tough and cicatricial, presented a very material obstruction to the emptying of the proximal loop of the jejunum into the distal loop. But, although I know this cannot be blamed for all cases of vicious circle, it is certainly my conviction that obstruction of the afferent loop is the most usual cause of pernicious vomiting." Deaver makes no criticism of the practice of the Mayos of stitching the mesocolon to the site of the anastomosis itself.

This case also illustrates the well-recognized necessity of prompt operation in the more acute cases of vicious circle. The symptoms may be as acute as those due to the commoner obstructions of the bowel, which are so rapidly fatal unless promptly operated.

PERFORATED GASTRIC ULCER; SUTURE AND RECOVERY.

DR. JOHN H. JOPSON related the history of a man, 50 years of age, who for five years had suffered from stomach trouble, his symptoms consisting of pain in the epigastrium, coming on after eating, and occasionally associated with vomiting. Vomiting had ceased after a few months, but pain had continued up to the present time, and for eight weeks before admission had been much more severe. He had vomited once, two weeks before admission. On September 9, the day before he entered the hospital, pain in the epigastrium grew rapidly worse and soon spread to the right iliac region. Twelve hours later it involved the entire abdomen, being most severe in the right iliac fossa.

He was admitted on the evening of September 10, 1905, suffering acutely and complaining of pain in the right iliac fossa. Temperature 100⅗°, pulse 120, respiration 28. The abdomen was slightly distended, and rigidity was generalized but most marked on the right side. Tenderness was extreme in the right iliac region, slight elsewhere. The expression was good. He was admitted for operation with a diagnosis of appendicitis, and the history of long-standing gastric trouble was not elicited before operation. The duration of the acute symptoms and the physical examination indicated a spreading peritoneal inflammation, apparently originating, still more pronounced, in the appendicial region, and it was with this diagnosis that he was transferred to the operating-room one hour after admission.

An incision at the outer border of the right rectus muscle disclosed free turbid fluid in the abdomen and pelvis. The cæcum and appendix were congested, the base of the appendix surrounded by a curtain of peritoneum, as though it had found lodgment in one of the rectro-cæcal pouches and later herniated through its wall. The appendix was liberated, and removed. It partook of the diffused peritoneal inflammation but was not the cause of it. The ileum was examined and found to exhibit signs of beginning general peritoneal inflammation only. Fresh adhesions were discovered above the wound in the direction of the gall-bladder and pylorus. The wound was enlarged upward, almost to the costal margin, and a perforation, one-eighth of an inch in diameter, was found on the upper border of the pylorus, actively leaking, and was turned in by a layer of interrupted and one of continuous Lembert sutures. The infection had travelled downward to the pelvis along the right side of the abdomen, as indicated by numerous fresh adhesions and lymph-patches in this region. After free flushing with saline solution, the abdomen was drained from diaphragm to pelvis by iodoform and plain packing above and to the inner side, holding back the small intestines, a strip into the kidney pouch, and tubular and gauze drainage in the pelvis. A few silkworm-gut sutures were placed over the packing to hold it in place, but the wound was not closed. The patient stood the operation remarkably well and suffered but little shock at any stage, in spite of free manipulation of the abdominal contents and widespread infection.

After operation he was placed in the Fowler position and given frequent saline enemata, and convalescence was uneventful except for some vomiting on the second day after operation. The bowels were moved spontaneously on the third day and he was fed by the rectum for five days. The large wound healed slowly and he was in bed for nearly two months, and in the hospital for three.

The patient was brought in as a case of appendicitis; the gravity of his condition was recognized by the resident physician, and preparations for operation were begun at once.

Had a more complete history been elicited before operation a diagnosis of ruptured gastric ulcer should have been arrived at. As it was, the physical signs pointed strongly to an infection,

reaching its greatest intensity in the appendicial region, symptoms which accorded well with the history of an illness dating back only a day or two, which the patient gave when first seen. There were no disadvantages attending the primary low incision; indeed it was proved to be advantageous, as when extended it gave the best possible drainage along the entire route from pylorus to pelvis, which the infection had already travelled, and the drainage was much more effective than could have been obtained by primary incision in the epigastrium and secondary suprapubic drainage, as is usually advised. The freedom from shock during and after operation was very striking in a case with such an extensive peritoneal involvement.

GASTROPTOSIS AND DILATATION.

Dr. Edward B. Hodge reported the case of a woman 33 years of age who was admitted to the Presbyterian Hospital, July 31, 1905. For the preceding three months she had been under treatment in the dispensary of the hospital, but without benefit.

Since the birth of a child, in 1892, she had suffered from sour eructations, vomiting, burning pain in stomach, flatulence, marked constipation, with headache and extreme nervousness. From her usual weight of 140 pounds she had fallen to 114 pounds.

On inflation of the stomach, its lower border was found to be two and one-half inches below the umbilicus.

After some weeks' observation in the hospital, during which her weight had fallen still further, to 95 pounds, and she had become anxious for some operation for her relief, it was decided to elevate the stomach by shortening the gastrohepatic ligament.

On October 13, with Dr. Willard's assistance, Dr. Hodge opened the abdomen in the middle line below the ensiform. The lesser curvature was about half way to the umbilicus, and the greater curvature ¾ inch below the umbilicus. There was no evidence of ulcer, recent or old; the pylorus was opened and the gall-bladder found to be normal. Three transverse rows of interrupted silk-sutures were put in the gastrohepatic ligament, bringing the stomach well up under the liver. As the stomach was dilated, at Dr. Willard's suggestion, about 2 inches of the anterior gastric surface was folded in with a continuous transverse silk

suture, midway between the curvatures. The abdomen was closed in layers. Convalescence was easy, and before patient left the hospital, on November 28, she was eating a generous mixed diet. She is now perfectly comfortable, does all her housework except washing, and weighs 125 lbs., a gain of 30 lbs. The bowels move daily without a laxative. Stomach tympany extends from just below the ensiform to ½ inch above the umbilicus.

Dr. H. D. Beyea said he had performed this operation upon eight patients. All except one improved very remarkably. The exception was an extremely neurasthenic girl, who improved during a period of six months and then was obliged to nurse two sisters during attacks of typhoid fever; she is now no better than she was at first. All the other patients gained weight and all were relieved of the gastric symptoms.

URETERAL CALCULUS.

Dr. John B. Deaver read a paper with this title (for which see page 733).

TRANSPERITONEAL EXAMINATION OF THE URETER IN CASES OF SUSPECTED URETERAL CALCULUS.

Dr. John H. Gibbon read a paper with this title (for which see page 743).

Dr. William L. Rodman, speaking to the questions propounded by Dr. Deaver, said that the Röntgen rays are not always satisfactory in the diagnosis of calculi in the kidney and ureter, many mistakes being made thereby. This is especially true when the supposed lesion is low down and well toward the median line of the pelvis. In this location little bodies described as centres of calcification in cartilages have by different observers been mistaken for calculi. With Dr. Pfahler the speaker had had at least three such cases. In the first case, a woman, the skiagram showed what seemed to be certainly two stones in the ureter low down near the bladder. His suspicions were aroused, the ureter was catheterized and the hard bodies felt and demonstrated to be disconnected with the ureter. Very recently a similar condition was shown by a skiagram in a young man without renal or vesical symptoms. It was plainly such a case as Bevan and others have demonstrated to be points of ossification or calcification of the

ligaments. Bevan, of Chicago, has seen many such cases. As to opening the ureter by the transperitoneal or extraperitoneal route he believes there is no doubt of the almost unanimous opinion that the extraperitoneal is the safer. In fact, it may be said in view of all that has been learned upon the subject that the intraabdominal method is at the present scarcely warranted. The operation can be done by this method but the surgeon who so does is courting disaster. In cases of encysted stone near the bladder the site can usually be reached through the bladder by means of a suprapubic cystotomy. He was interested in Dr. Gibbon's reported combining of extra- and intraperitoneal methods in removing a calculus. Dr. Gibbon is correct in saying there is danger of soiling the peritoneum; he would prefer the extraperitoneal route always, but when working in the abdomen as was Dr. Gibbon the method employed by him may very well be used.

Dr. George G. Ross spoke of a case of ureteral calculus in which operation was not performed. The patient had repeated attacks of renal colic and after each passed bloody urine. The X-ray showed a dense shadow near the neck of the bladder. The man was a travelling salesman and declined operation, taking morphine to relieve the attacks. One morning he reported jubilantly that he would have no more attacks as the night before he had passed an enormous amount of urine during sleep and a day or two later the calculus was passed by the urethra. There evidently had been obstruction of the ureter and hydronephrosis, which was relieved by the passage of the stone.

Dr. John B. Roberts said that ten years ago he reported the transperitoneal removal of a ureteral calculus. He found no difficulty in keeping the peritoneum perfectly clean and both the ureteral and abdominal wounds healed by first intention.

Dr. Gibbon, in closing, corroborated Dr. Rodman's statements regarding transperitoneal operation upon the ureter; it is seldom justifiable. In the cases reported, however, the removal of the calculus was not transperitoneal, the ureteral operation itself being entirely outside of the peritoneum. Under such circumstances if the surgeon so desires he can close the peritoneum before taking the stone out of the ureter, but the manipulation made possible by the peritoneal opening enables one more easily to remove the calculus. Without such opening it is utterly impos-

sible to get at the ureter throughout its entire length unless the kidney be delivered and access gained in that manner. In both the cases reported the microscopic findings of blood in the urine were of great diagnostic value. If a stone is found in the ureter when operating for appendicitis, it should be removed. In such an instance, as before stated, the surgeon can choose the route by which he will remove the calculus.

RENAL CALCULUS WITH MAGGOTS WITHIN THE STONE.

Dr. John H. Gibbon reported the case of an Italian laborer, 33 years of age, who was admitted to the Pennsylvania Hospital July 21, 1905 and transferred to the surgical wards on July 24. At this time he had all the symptoms of a pyonephrosis on the left side, although he was able to be up and about at times. There was a large quantity of pus in the urine and marked tenderness over the left kidney. Cystoscopic examination was unsatisfactory. He was operated upon and a large soft calculus was found to occupy nearly the whole pelvis of the kidney, which extended up in the calices and was removed in two portions. There was a large quantity of pus in the kidney which had a very foul odor. The wound was drained and partially closed. The stone was examined in the laboratory on the same day of its removal. The larger portion measured 2x2½ cm. in diameter; the small portion measured 1x1½ cm. and the weight of both was 17.5 garms. Passing through the larger portion of the stone were a number of small smooth channels in which were found numbers of minute maggots. Dr. Gibbon saw the specimen the next day when the maggots were still quite active, crawling in and out of the channels in the stone. The maggots were so small that their nature was doubted for a while. A number of them with a portion of the stone was sent to Dr. Charles Wordell Stiles, of Washignton, who reported that they were the maggots of the ordinary domestic fly. On the fourth day after the operation the dressings removed from the wound were kept over night wrapped in a sterile piece of gauze surrounded with wax paper, and on the following morning there were a large munber of full-grown maggots present. In none of the subsequent dressings were maggots found. The patient made a good recovery from his operation, but as the sinus continued to discharge large

quantities of pus, and as occasionally the drainage would be interfered with, Dr. Gibbon removed the kidney on November 25th. The patient made a satisfactory recovery from the second operation.

In questioning the patient it was learned that in Italy he had some years previous had inflammation of the bladder for which irrigation was done. The first symptoms of his present illness appeared a few months before his admission to the hospital and at this time he irrigated his own bladder. He says that he was always careful in performing this irrigation to have the catheter and solution clean, and he cannot recall ever having seen flies on the catheter. It is probably true, however, that this was the source of the infection.

HYDRONEPHROSIS; DISTENTION OF URINARY BLADDER.

Dr. Gibbon also reported *a case of cystic kidney with obliterate ureter associated with a fibroid uterus causing a chronic distention of the bladder with retention of urine.*

This patient was admitted to the Pennsylvania Hospital on November 17, 1905. She was 43 years of age, a widow, and had never had children. She came to the hospital because of a large tumor in the lower portion of the abdomen and marked vesical and rectal tenesmus, the latter symptoms being of but a few weeks' standing. Examination showed a tumor projecting above the pubes which was quite hard and which on bimanual examination seemed to move with the uterus. Two distinct tumors could be felt in the uterus, one in the anterior portion just above the cervix which pressed upon the bladder, and the other could be felt through the rectum which was nearly occluded by it. A diagnosis of fibroid tumors of the uterus was made and a hysterectomy recommended. When the abdomen was opened it was discovered that the tumor felt above the pubes was a greatly distended bladder. One hour previous to the operation the patient had been catheterized and 26 oz. of urine withdrawn; on the table the catheter was again introduced and 20 oz. of urine withdrawn. The bladder did not contract when emptied but collapsed in thick folds, the wall appearing to be about ½ inch thick. The uterus contained a number of fibroids: one on the anterior surface low down pressed against the bladder in such a way as to produce

obstruction just as an hypertrophied prostate does in a man. Examination of the ureters at their point of crossing over the iliac vessels showed no distention of either. An examination of the kidneys showed a normal right kidney but the left was an enormous cyst. A hysterectomy was done and then the left kidney was exposed through a lumbar incision. It was so large that it was impossible to remove it without emptying it, and even after the escape of a large quantity of grayish, odorless fluid the delivery of the kidney was difficult. In ligating the pedicle the ureter could not be made out. This kidney was subsequently examined in the laboratory and no ureter could be found. The kidney substance had been so completely destroyed that none could be found microscopically. The kidney measured 25 cm. in length by 15 cm. in width, and the wall varied from 1 to 4 mm. in thickness. The patient made an uninterrupted convalescence.

UNREDUCED ELBOW DISLOCATION.

Dr. William J. Taylor showed a skiagraph of an unreduced forward dislocation of the elbow taken three weeks after the accident, as well as a skiagraph taken the day following the reduction of the dislocation.

The patient was a young man of 29 who, while playing football, fell upon the ball, and as he fell another player running up behind accidentally kicked him on the lower end of the left humerus just above the elbow; this produced the dislocation without fracture.

Three weeks after the accident he came to Dr. Taylor, who had a skiagraph taken which revealed the true condition of affairs. Owing to some unavoidable delay it was nearly four weeks after the accident before the attempt could be made at reduction. He was given ether and after a great deal of physical effort and limbering up and breaking up the adhesions of the elbow, reduction was accomplished. The second skiagraph showed very well the bones in their proper relation.

AN ETHER INHALER FOR USE IN OPERATIONS REQUIRING THE PRONE POSITION.

Dr. Thomas C. Stellwagon (by invitation) presented this apparatus. It was devised to obviate the difficulty experienced in administering ether to patients when prone, especially when the

Edebohl technic is employed. In addition, with the ordinary inhaler a very large amount of ether is required. He at first used a rubber bulb to force ether into the old inhaler but this proved unsatisfactory. The present modification has been in use in the Jefferson Hospital during the past six months and has met with general approval. With it considerably less ether is required. The addition consists of a lateral extension, near the lower end of the instrument, which is placed over the mouth of the patient. The hood-shaped mouthpiece is reversible to allow application when the person is on either side. But one hand is required to hold this inhaler to a patient's face. A question regarding the device that is not yet entirely settled is whether the patient gets sufficient air with the ether. Possibly a valve above the mouthpiece is needed to permit the egress of expired air.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, January 5, 1906.

The President, Dr. D. A. K. Steele, in the Chair.

POPLITEAL ANEURISM, RUPTURED BY MANIPULATION.

Dr. Charles Adams reported the case of a man, aged 58 years, who was seen in consultation with Dr. M. C. Bragdon, August 7, 1905.

He has been the subject of indigestion and headaches most of his life and early in July last put himself in the hands of an osteopath for treatment. The lack of judgment displayed by this operator was excelled in degree only by the vigor of his treatment. This worthy's governing idea seems to have been violent over-extension of the extremities, one particular fancy being to extend the lower limbs on the pelvis and then bend the legs over the body toward the patient's shoulders. He expressed himself as particularly pleased when he could "hear 'em crack." For a man of nearly sixty, with atheromatous arteries all over his body, the treatment was, to say the least, strenuous. After two weeks of this manipulation the patient became lame, too lame to get about, so, in spite of the appearance of a swelling behind and below the knee, the treatment was continued at the home of the patient until he could no longer endure the torture and finally sent for his physician, who, recognizing the surgical character of the case, called a consultation.

Dr. Adams found the patient suffering from severe pain in the right leg; the calf was distended to one and two-thirds the

size of its fellow, the skin heightened in color and shiny; the pulse was 110, the temperature 102° F. At this time, pulsation could be felt in the dorsalis pedis. At his next visit, he found entire absence of pulsation below the knee, the foot cold, and there could be no doubt that rupture of the popliteal had produced the condition present. Exploration of the swelling gave vent to a large quantity of fluid blood and clots in various stages of organization which had filled the popliteal space and a cavity beneath the posterior muscles of the leg. Amputation was performed through the middle third of the femur. The blood-vessels were so soft that direct ligature to them was impossible. Hæmostasis was effected by inclusion of neighboring tissues in the ligatures. The wound healed practically by first intention, but for ten days the man was septic probably from autointoxication, as the condition cleared up after repeated catharsis and no other cause could be discovered.

Examination of the amputated limb showed a true aneurism of the popliteal artery, ruptured in its posterior surface, forming a false aneurism which again ruptured and resulted in the condition found at operation.

HYDRONEPHROSIS AND APPENDICITIS.

Dr. Charles Adams described the case of a man, 60 years of age, who in 1876 began to suffer with attacks of dull heavy pain appearing, with gradual onset, at about the junction of the eleventh rib and the right scapular line, extending forward in the direction of the navel and lasting three to four hours at a time. These attacks came on about once in three months during a period of two years. They were somewhat relieved by sweats and hot drinks, and apparently accompanied by no urinary or bowel trouble. There has been no pain in the abdomen since the cessation of the acute attacks, in 1878. A tumor, a long ovoid mass, occupying the right side of the abdomen from the costal margin nearly to Poupart's ligament, was first noticed in 1900 and has undergone a gradual increase in size since that time.

A diagnosis of hydronephrosis was made and confirmed by a cystoscopic examination, made by Dr. W. N. Senn, which showed that no urine entered the bladder through the right ureter.

After due preparation the patient was operated on at the

Evanston Hospital. A vertical incision was made, over the prominent portion of the tumor through the outer border of the right rectus muscle, the two layers of peritoneum identified and cut through.

The tumor was enucleated from its bed without difficulty. The renal artery, comparatively small, and one large vein (⅜ inch) were ligated, as was also the ureter; the latter in its free portion, however, was impervious. The tumor, which was about ten inches long by six inches in transverse diameter, consisted of an exceedingly thin-walled cyst containing eleven pints of perfectly clear fluid. The ureter was stretched across the anterior surface of the tumor, adherent and occluded.

The retroperitoneal space was dried out, and there being no hemorrhage the intestines were allowed to fall into place, and search was made for the appendix vermiformis. It was found buried in a mass of adhesions some of which were quite ancient. The appendix itself was exceedingly soft and ruptured during the attempt to separate it from the surrounding adhesions, giving issue to a small mass of inspissated pus. The parts concerned were carefully cleansed and the abdominal wound closed by suture in layers. The condition of the appendix was remarkable in view of the fact that at no time while the patient had been under observation had there been any pain or disturbance of temperature or pulse, nor could he remember having had any pain in the abdomen since the attacks noted above as ceasing in 1878. Recovery smooth and complete.

HYDRONEPHROSIS.

Dr. Charles Adams also reported the case of a woman, 34 years of age, who fourteen years previous to operation had a severe attack of pain in the right loin and groin following a long walk. Other attacks followed, and during the attack a tumor was noticed in the right side of abdomen. Her then physician made a diagnosis of intermittent hydronephrosis from flexion of the ureter due to mobility of the kidney. The kidney was successfully kept in place by bandage for about four years, after which time two severe attacks of pain occurred and the tumor became permanent.

In November, 1897, the tumor was aspirated or tapped and leakage occurring into the peritoneal cavity, Dr. Fenger saw her and opened the abdomen, cleansed its cavity and sutured the dilated kidney to the anterior abominal wall. The constant discharge from the fistula remaining after the operation was a source of so much annoyance to the patient that Dr. Adams removed the kidney by abdominal incision in February, 1898. No difficulty was met in the operation except in separating some adhesions to the colon. The patient made a smooth recovery. In this case only the upper half of the kidney was involved in the dilatation, the secreting structure of the lower half it would seem had been made inoperative after a certain degree of tension had been reached and resumed its function after the tension had been relieved by the establishment of the fistula.

NEPHROLITHOTOMY—CYSTONEPHROSIS.

Dr. Charles Adams further reported the case of a woman, aged 31, who ten years previous to coming under his care in 1900, just after concluding her course in college, began to suffer from constant lassitude, headaches and extreme constipation, feeling generally "run down." While sea-bathing she was taken with a severe chill, was carried home on a litter and confined to bed for five months with what was called "a low type of peritonitis." After getting up from this attack she was treated for almost every form of abdominal inflammation for a period of eight or nine years, going about the country and suffering many things at the hands of many physicians. During most of this time a painful lump was apparent in the right side of the abdomen, which was generally pronounced to be an enlarged gall bladder. She suffered from constant backache and headache, was in bed with excruciating pain for three days every month, her urine was purulent and foul smelling, occasionally bloody; she slept badly, and was extremely constipated.

Examination of the abdomen showed a freely movable, enlarged and exquisitely tender right kidney; through the rectum could be felt a fixed and slightly anteflexed uterus; the ovaries very tender to touch. The right ovary was enlarged, presumably cystic; the condition of the left was uncertain.

August 30, 1900, the abdomen was opened in the median line between the umbilicus and symphysis by a three-inch incision, the uterus tubes and ovaries were bound together and covered by dense tough adhesions. After much trouble the right ovary was uncovered and found to be cystic throughout and was therefore removed. The left ovary was much smaller than normal and exceedingly hard. On account of the ten years' history of continual pain and the beforehand expressed wish of the patient, it was also removed. (During the subsequent course of the case none of the symptoms present seemed to be due to the laparotomy.) After closing the abdominal wound the patient was placed on the left side and the right kidney exposed by Simon's incision at the edge of the erector spinæ. The organ was somewhat thinned out by distention and a calculus was plainly palpable through its substance. The kidney was incised through its convexity and the calculus extracted entire. The ureter was catheterized to prove its patency and the kidney fastened to the muscular structures by stitches of catgut passed through its capsule. Tubular drainage was employed, the tube being passed into the pelvis of the kidney and secured by a suture to the wound margin.

Before the operation the patient's temperature was rarely below 99° F. and generally about 100° F. The pulse ranged from 72 to 90, varying with the amount of pain experienced. In the night following operation the temperature rose to 102.8 and the pulse to 160, and from this time on the pulse was much higher proportionately than the temperature, probably due to the effect of operation shock on the cardiac muscle. The patient was intensely hyperæsthetic, the stomach exceedingly irritable, the most careful and gentle dressings of the lumbar wound frequently would produce attacks of nausea and vomiting lasting for hours. During the ten days following the operation the patient's temperature gradually decreased to about 99° F. The pulse remained weak and from 20 to 30 beats higher than what would correspond to the temperature. Feeding, salt solution enemata, and cardiac stimulation were thoroughly kept up during this period.

On the twentieth day after operation the patient had severe pain in the operated kidney, the urine from the bladder, which had been purulent, suddenly became clear, while through the small

opening left in the lumbar wound there was only slight discharge. A large sterilized catheter was introduced into the renal pelvis and relieved an obstruction of the ureter, irrigating with boric solution. This procedure was followed by a severe chill, and fever which lasted five days, the temperature reaching 104.4° F. During the following eight days it gradually became apparent that little or no urine was passing through the right ureter. Dr. Adams reopened the lumbar wound and made a digital exploration of the pelvis of the kidney. A yielding elastic diaphragm seemed to intervene between the examining finger and the ureteral opening. The greater portion of the renal pelvis was entirely shut off from the ureter by adhesion of the thinned-out septum, above the lowest calyx, over the ureter.

The kidney was sufficiently bisected to expose this diaphragm in which a cruciform incision was made; this being followed by only slight bleeding the flaps were clipped away, leaving a clear opening of an inch across. Hemorrhage from the renal parenchyma, although at first free, was checked by sterile gauze packing, which was left in position for 36 hours. The patient suffered considerably from shock, but rallied well after two or three days and since has enjoyed good health so far as the renal function is concerned.

GONORRHŒAL PYELITIS,—NEPHROTOMY,—NEPHROLITHOTOMY,—NEPHRECTOMY.

Dr. Charles Adams reported also the case of a man, aged 31 years, who four or five months ago contracted a specific urethritis, mild in character and neglected by the patient, who did not suspect its real nature. Four weeks before admission to the hospital the bladder became involved, the infection traveling rapidly through the ureter to the right kidney. This sudden invasion of the bladder was attributed by the man to a severe strain received in attempting to save himself from falling. Directly following this strain he felt acute pain in the bladder, along the course of the ureter and in the right loin, and there was an increase of the urethral discharge which became blood-stained. At the time of Dr. Adams' examination the man presented the characteristic signs of cystitis, with tenderness of the ureter and enlargement and tenderness of the kidney.

After preparation of the patient by a course of urinary antiseptics and cleansing of the field of operation, the kidney was exposed by Simon's vertical incision, opened through the convexity and from 4 to 6 ounces of pus were evacuated. The renal pelvis and ureter were thoroughly flushed with a one per cent. solution of iodine. Irrigation of the renal pelvis and ureter with iodine or silver nitrate solution was practised every day so long as the lumbar wound remained open. The gonococci which were present in numbers in the pus evacuated from the kidney and that from the bladder at the time of operation were not to be found after two weeks of this treatment. There was still a small amount of pus in the urine at the time of the patient's leaving the hospital, less than four weeks from operation. Directly after leaving hospital the man resumed his work, heavy lifting, etc., about a milk depot, but was not perfectly well, feeling occasionally some pain in the right loin. These attacks of pain after two years increased in frequency and severity, gradually shaping into attacks of renal colic. The urine became more purulent, occasionally bloody, and finally three years from the first operation the patient was compelled to give up work and was again admitted to hospital with tenderness in the right loin, pain extending down the ureter with retraction of the testis and pus and blood-corpuscles in the urine. A diagnosis of renal calculus was made and the kidney again opened and two calculi removed. The progress of the case was quite satisfactory for nearly a month; the wound had healed except for a small sinus left after removal of the drainage-tube, when it became suddenly apparent that blocking of the ureter had occurred. The urine which had been passing almost wholly by the ureter was discharged through the loin, the quantity per urethram being correspondingly lessened; so the wound was reopened and a small flake of calculus material removed from the ureteral opening with forceps. This relieved the condition, and shortly afterward he left hospital with a small sinus discharging a small amount of purulent urine and occasionally calculus material. This sinus persisted for nearly a year, the amount of discharge becoming greater and more annoying until the question of removing the kidney was considered.

During the intervals between operations he led a very active life of real hard work. Every effort had been made by his

attending physician by irrigation, and stimulating injections to stop the suppurative process, but to no avail, so in November, 1901, Dr. Adams removed the kidney.

The kidney presented a pyelitis with much hardening of its parenchyma, and embedded in the renal substance at its lower end was a collection of small calculi.

The resistance of the indurated kidney was such that this deposit could not be felt between the thumb and finger. The man made a prompt recovery from the final operation and has been in perfect health since that time.

Dr. Adams said that he was quite sure that the calculi found in the renal pelvis were formed between the first and second operations, but he was surprised at the complete and sudden disappearance of the gonococcus after its exceedingly active invasion of the bladder, ureter and kidney.

TELANGIECTATIC LIPOMA.

Dr. D. A. K. Steele presented a man 54 years of age who four years ago first noticed a round, semisolid tumor on the back to the right of the spine, about the third dorsal vertebra. At this time he suffered no inconvenience from the growth. On palpation there was no pain or signs of inflammation. From the time the growth was first observed, it had slightly increased in size until the end of the first year, when it was about the size of a large orange. This was three years ago. For the past three years the tumor had grown more rapidly, without causing any pain or inconvenience, until within the last three months, when it was noticed that the growth increased in size rapidly and began to cause some inconvenience from its size.

This growth was 21 inches in diameter, and 61 inches in circumference; its long diameter was 19½ inches and transverse diameter 10 inches. Careful examination would show a number of large venous trunks running over the surface of the tumor, some of them as large as the finger. The growth presented the characteristic feel of a fatty tumor. It was lobulated. Dr. Steele believed that it was not a simple lipoma, but one of those rare mixed forms of cavernous lipomas in which there was a mixture of the greatly enlarged blood-vessels, large lipomatous

lobules or masses typically circumscribed or incapsulated lobules; but running through the meshes of the lipomatous masses were greatly enlarged blood-vessels, the telangiectatic lipoma described by some authors. It was attached rather firmly above and had not from its weight passed down the back.

He had arranged to operate for the removal of this tumor, but thought the case was one of sufficient interest from a diagnostic point of view to exhibit before any operation.[1]

INGUINO-PROPERITONEAL HERNIA; INGUINO-INTERSTITIAL HERNIA.

DR. ALBERT E. HALSTEAD reported a case each of inguino-properitoneal, and of inguino-interstitial hernia, with critical remarks. For this paper see page 705.

TUBERCULAR PERITONITIS WITH GREAT DISTENTION OF GALL-BLADDER.

DR. BAYARD HOLMES reported the following case: A man, 38 years of age, first came under his observation in September, 1905. He was married, and had three children, two living and in good health, the other child having died at the age of two of an acute infectious disease. His wife was several months pregnant and in good health.

He had always been a strong, healthy man until the fall of 1902, when he suffered from a severe and protracted pneumonia and pleurisy covering a period of about two months. Following this he was in good health until the fall of 1904, when he suffered severe pain in the right side of the abdomen, associated with considerable fever. He apparently recovered within a week or two. Later, however, in February, 1905, and again in May, 1905, he suffered similar attacks of pain and fever. About July 1, 1905, his finger was crushed in a machine. It healed very

[1] The tumor was excised next day by lifting up the tumor-mass and transfixing its broad pedicle with a very long pedicle-needle threaded with a rubber ligature, which was tied around the two halves of the base, permitting a bloodless excision of the tumor, which weighed eleven and one-half pounds, and on section proved to be a telangiectatic lipoma. The wound healed by primary union, and the patient returned to his home at the end of one week.

FIG. 1.—Telangiectatic lipoma of back.

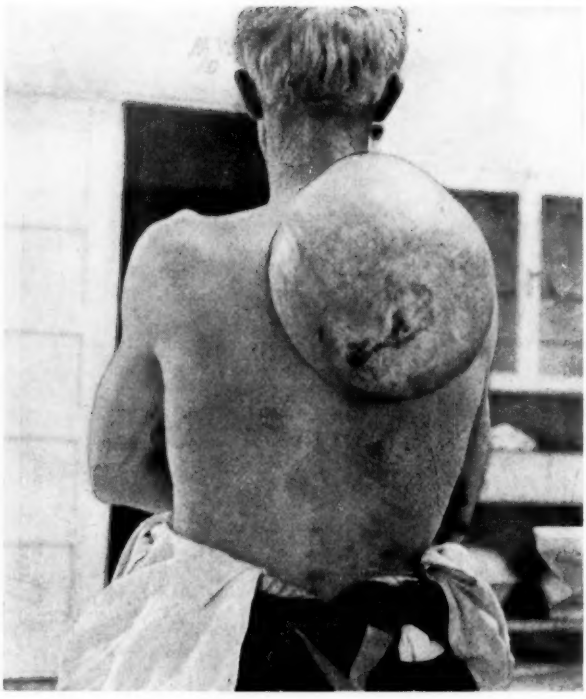


FIG. 2.—Lipoma of back.

FIG. 3.—Lipoma of back.

slowly, and he was unable to return to work. At this time he began also to complain of loss of strength, anorexia, night sweats, and later of enlargement of the abdomen.

Dr. Bayard Holmes, Jr., found him with a temperature of 100, a pulse of 120. His skin and conjunctivæ presented a slight icteric hue, and he was slightly emaciated. The abdomen was considerably enlarged, and the presence of fluid in the abdomen was easily demonstrated. He complained of much pain in the region of the gall-bladder, discomfort after eating, looseness of the bowels, marked weakness, night sweats, and gradual increase in the size of the abdomen. A diagnosis was made of a tuberculous peritonitis, with a probable pus infection of the gall-bladder. He entered Wesley Hospital on September 25. His condition was practically the same, except that he was suffering very severely of pain in the right half of the abdomen, and the increase in size of the abdomen was considerable.

As soon as the anæsthetic was given the abdominal wall relaxed sufficiently to show the presence of a tumor the size of the fist in the region of the gall-bladder. An incision was therefore made on the border of the right rectus, which disclosed a large quantity of a serous, perfectly clear fluid free in the peritoneal cavity, and a gall-bladder so excessively enlarged and tense that it was believed to compress the portal vein and thus produce ascites. This corresponds also with the inability of the patient to take food. The incision was, however, sufficiently extended to introduce the hand, allow the fluid in the lower abdominal and pelvic cavity to escape, and when the abdominal walls were sufficiently relaxed to permit the introduction of the hand and arm, and the careful palpation of all the abdominal viscera. No evidence of tuberculous peritonitis was discovered anywhere, and no pathologic condition except the adhesions between the spleen and the abdominal wall, and the unusual condition of the omentum, which was rolled up in a mass on the lower border of the stomach. The gall-bladder was extirpated and the cystic duct found dilated so that three or four of the haustra contained dark calculi. The contents of the gall-bladder was a thick, mucopurulent fluid. The wall of the gall-bladder was about 3 mm. thick, and its surface was devoid of the natural

appearance of the gall-bladder. The gall-bladder was connected with the common duct by an excessively small cystic duct, which was found to be pervious after the gall-bladder was removed and tested with water under high pressure. The cystic duct was held in a six-inch artery forceps, which extended out of the corner of the wound. It was surrounded with a strip of iodoform gauze. The abdominal wound was closed and a large dressing applied. The quantity of serum which was removed from the abdomen during the operation must have been several pints. During the first two or three days there was an enormous quantity of drainage into the dressings, but no bile. The muscular portion of the abdominal wound closed perfectly, but an abscess appeared in the fat which required the skin incision to be opened. The artery forceps was removed on the third day and the gauze a little later. There was no discharge of bile. By the end of a week the abdomen began to be filled up again, and after making sure that there was no mistake the colon was separated from the anterior abdominal wound and a glass tube with numerous perforations passed into the lower peritoneal cavity through the original incision. This collapsed the abdomen and remained in place for several days. The abdomen never became distended again. The patient now became delirious, had a rapid pulse and low temperature and rapid respiration, averaging 101, 124 and 28. Much symptomatic medication and treatment was given, but the patient rapidly emaciated. The abdominal wound closed except for the skin, but occasionally a little bile would appear in the scar, which seemed to come from the injured surface of the liver. He died five weeks after admission, on the 31st of October.

A necropsy, performed by Professor Zeit, revealed the peritoneum everywhere covered with a recent miliary tuberculosis. There was an acute miliary tuberculosis of the left pleura, tuberculous peribronchitis and broncho pneumonia at the apices of both lungs; chronic fibrous pleurisy of the right lung, œdema of the lower lobes of both lungs; anthracosis of both lungs; acute splenic tumor and tuberculous perisplenitis; acute miliary tuberculosis of the spleen; chronic diffuse nephritis, parenchymatous type, large red kidney, with beginning secondary con-

traction; atrophic cirrhosis of the liver, tuberculous perihepatitis; acute miliary tuberculosis of the liver; nodular arteriosclerosis of the arch of the aorta and thoracic aorta, and fibrous endocarditis of the mitral valves; the gall-bladder absent, and no adhesions.

Dr. S. C. Plummer, relative to acute tubercular peritonitis following some injury, related the following case: A man received a very hard kick in the right iliac region of the abdomen; there supervened a tympanitic condition, which was more marked in the region of the contusion, but involved the whole abdomen. In view of the severity of the injury, and the tympanites following so rapidly, it seemed possible that there was a rupture of the intestine or some other severe intra-abdominal injury. So a laparotomy was done, but did not reveal any result of the recent injury. An omental adhesion was found which was probably the result of a previous appendicitis for which the patient had been operated upon, the appendix having been removed at the time. The man made an immediate recovery, although there seemed to be more paresis of the bowel than was ordinarily the case after an abdominal operation. About two months afterward he was brought to the hospital again and came into the service of Dr. Schroeder. At this time he had symptoms of acute intestinal obstruction. Dr. Schroeder performed a laparotomy and found very extensive tubercular peritonitis, from which the man shortly afterwards died. At the laparotomy immediately after the injury, he examined all the abdominal contents and did not find any sign whatever of tubercular peritonitis, so that it looked as if the injury or the first laparotomy was the etiological factor in the causation of this tubercular peritonitis.

Dr. Charles Davison said that Dr. Holmes' case reminded him of one he saw in the County Hospital a number of years ago. The patient was in the medical service of Dr. Billings, and was referred to the surgical side with a diagnosis of cholecystitis, with gall-stones, a diagnosis that none would question under any circumstances, inasmuch as the symptoms were as typical of a case of cholecystitis, with gall-stones, as they possibly could be. The patient had had typical attacks of gall-stone colic while in the hospital where they could watch him closely. His

abdomen was opened with the expectation of finding a distended gall-bladder, with stones in it. He could feel a tumor from the outside before operation. After the abdomen was opened, he found a collection of fluid below the liver, above the colon, to the outside of the gall-bladder, accompanied by slight adhesions, the fluid amounting to about ten ounces. The gall-bladder was not thickened, not distended, and contained nothing. The cavity which he opened and drained was studded with miliary tubercles to the naked eye, but he could find nothing of the kind anywhere else in the immediate neighborhood in the abdomen. The cavity was drained, and the patient got well, at least temporarily, so as to leave the hospital. He had not the general appearance of a tuberculous patient. No miliary tubercles were found in any other part of the body. The patient was in apparently good health.

Dr. L. L. McArthur referred to the careful résumé of the subject of tubercular peritonitis by Fürst in his monograph on Intestinal Tuberculosis. In this he demonstrates, by going over the work of a large number of pathologists of note, that tubercular peritonitis is often secondary to a primary tuberculosis of the intestines or mesenteric glands, and primary in the true sense. Not clinically primary, simply, but because of the passage of microörganisms through the even uninjured mucosa into the lymphatic glands, and from the lymphatic glands creating a peritoneal tuberculosis. We might hope in the future to operate far more early than in the past, perhaps before the period of ascites had developed. By the removal of the enlarged lymphatic glands that not infrequently could be clinically palpated, we might both cure the patient symptomatically and prevent those later stages which were so frequently hopeless. He, too, had furnished evidence which, to the unbiased mind, went to prove that occasionally primary peritoneal tuberculosis resulted from the swallowing of the bovine bacillus. Koch has lately turned so squarely against his former dictum as to say it never produces a human tuberculosis. Nevertheless, cases are now to be found in the literature, as quoted by Fürst. He thought if we had the opportunity to make earlier operative interference we could save many cases now lost.

DR. DANIEL N. EISENDRATH said the case of Dr. Holmes brought up the subject of the acute onset of tubercular peritonitis. He had met with two cases of this kind, which he would relate. One of them was a young man whom he saw last spring on account of what appeared to be a tumor in the abdomen. The patient stated that two months previously he was taken sick at Indianapolis with a sharp pain in the right iliac region, and the physician who treated him for appendicitis told him there was no question but that he had appendicitis.

Dr. Eisendrath saw the patient two months later, when he had a prominence to the right side at about the level of the umbilicus, which fluctuated distinctly. He could replace it and palpate it bimanually. The tentative diagnosis was that the tumor had no connection between appendicitis, and it was thought that the case was one of hydronephrosis or mesenteric cyst. On opening the abdomen a large abscess cavity was found which extended upwards, which was limited strictly to the median line, extended downwards to the region of the appendix, a little above and backwards as far as the midaxillary line, upwards to the middle of the liver. The case turned out to be one of encapsulated tubercular peritonitis, which had begun very acutely with a sharp pain, as described.

In a second case, a woman had been taken sick rather suddenly, with a temperature ranging from 103° to 104°. She had all the symptoms of typhoid, and had been treated for six weeks. He thought the woman had tympanites. When Dr. Eisendrath saw her she had free fluid in the peritoneal cavity; also a high temperature. The case proved to be one of typical tubercular peritonitis. This form of acute peritonitis with sudden onset resembling typhoid fever is recognized and described in Osler's text-book.

DR. A. J. OCHSNER said that, in looking over the literature of tubercular peritonitis some three years ago for the purpose of preparing a paper, he found some very interesting facts which seemed not to have been generally put together. In the first place, it seemed from the literature that the early cases, which apparently appeared hopeless, and were found by accident, almost all were reported as having recovered. This may be accounted for

by the fact that if they did not recover the cases might not have been reported, or by the fact that nothing beyond an exploratory incision had been made. It seemed that for a number of years the cases that were reported were those in which surgeons had made wrong diagnosis. They had diagnosed a cyst, had opened the abdomen, had inserted a drainage tube, and told the friends that the case would be fatal, and it was a great surprise to them when these patients did not die. Presently the diagnosis was made beforehand and various surgeons began to operate for this condition, shortly after which there was a great change noticed in the results. This change came about in this way: As the operation became more thorough, the mortality materially increased, so that when surgeons began to do really a thorough operation, they could count on losing a large proportion of their cases; but if they took the same class of cases apparently and did nothing but an exploratory laparotomy the patients would recover. This went on still further until some foreign observers found that these patients when treated without operation recovered in about fifty per cent. of the cases. The diagnosis, however, was not as positive as when the patient was operated. Cases of tubercular peritonitis that were operated upon also recovered to the extent of about fifty per cent. About that time, he said, Professor Fenger published a paper in which he brought together all of the various facts and theories, and came to the conclusion that it was very doubtful whether operative treatment did harm or good in these cases. But in looking over his own experience, which at that time covered quite a large number of cases, and in taking all of the facts together, it seemed to Dr. Ochsner that he was entitled to draw this conclusion, that in case those patients were not operated on in whom a diagnosis of tuberculous peritonitis had been made, the probabilities of recovery were fifty per cent.; that among the remaining fifty per cent. of cases if they were not operated on there would be no recovery. If operated upon, there would still be fifty per cent. recover, and it seemed, from the observations of a number of surgeons and from experimental observations, that operation was especially desirable in cases which did not improve with internal and dietetic treatment. Operating a certain class of cases which

showed improvement with internal treatment, there was no greater percentage of recovery in this class than there was in cases which refused to improve without surgical treatment, so that it seemed, in treating all patients surgically from the beginning, there would be a recovery of only fifty per cent., and in treating those that would not improve under medical treatment there would still be a recovery of fifty per cent. Experimental work on animals by several observers showed that an early artificial tuberculosis did not improve with drainage to the extent that the cases did in which they allowed the tubercular peritonitis to become chronic. Those that were older recovered more rapidly with drainage than those that were operated early, and the explanation was that these animals developed a certain condition which enabled them to manufacture their own antitoxin out of the residue of their tuberculosis after drainage had been established.

In the speaker's own cases of traumatic tuberculosis, the same as in the case reported by Dr. Plummer, and in a number which he had found in the literature, the progress was very rapid as compared to cases of tubercular peritonitis in which there was no definite traumatic origin.

He had operated upon a patient for gastric ulcer, with pyloric obstruction. There was at this time no sign of tuberculosis of the peritoneum, but within six months the patient returned with symptoms of obstruction, and it seeemed to him that something had gone wrong with the operation. But upon opening the abdomen it was found that these symptoms of obstruction were due to a very violent diffuse tuberculosis of the peritoneum, from which the patient had recovered under treatment.

The observations of Mayo in regard to tubercular peritonitis and tuberculosis of the intestines were of great value, because they had brought out clinically a fact that Dr. McArthur had mentioned, namely, infection through the intestine. The cases of patients that Dr. Mayo reported all came from a portion of the country where pulmonary tuberculosis is exceedingly rare. They practically all came from families in which there was no tuberculosis; they all came from families in which raw milk was used to a great extent, and these patients had nothing to indicate that they should have tuberculosis except the local conditions. Again,

practically all of them got well as soon as the abdomen was opened and drained, and they had remained well as long as they took sterilized milk afterwards. This, he believed, was the strongest anti-Koch demonstration that had been made.

DR. D. A. K. STEELE within the last two weeks had operated on two cases of tubercular peritonitis, one thirteen days ago, the other nine days ago. The patient upon whom he had operated thirteen days ago was a young Assyrian woman, who had many irregular, nodular tumors which could be felt in the abdomen. As he opened the abdomen he found the mesenteric glands were enlarged, together with some thirty or fifty others, which were the size, some of them, of a hazelnut, while others had attained the size of a hen's egg. It seemed rather formidable to shell out all of them, as the intestines were intensely injected. There was no evidence apparently of tubercular peritonitis, but he took it to be a tuberculosis of the mesenteric glands, involving all the glands in a profuse manner. He shelled out one of the glands for diagnostic purposes, closed the abdomen, and left the other glands in.

He asked Dr. McArthur whether in a case of this kind he would have removed all of the glands that were involved?

DR. L. L. MCARTHUR, in replying to the question of Dr. Steele, related a case in the person of the child of a surgeon of Boston, who had a sudden onset of the type of abdominal trouble that resembled in its characteristics very much an appendicitis. When he was operated upon for the supposed appendicitis, there were found innumerable enlarged lymphatic glands, such as Dr. Steele had described, in a child, nine years of age. These glands the operator continued to remove until the child was almost in a state of collapse. However, the child was perfectly well to-day, and to the speaker's mind had a typical case of tabes mesenterica, which, had it been allowed to go on, would have developed finally peritonitis, exhaustion, and ascites as a final result. Earlier operations both for intestinal tubercular ulceration, for tubercular appendicitis, and for tubercular gland infections, without observable lesion in the mucosa of the tract (bacilli have been artificially made to pass by food experiments into these glands, without an abrasion being demonstrable in the mucosa), would show such

changes in treatment as had occurred in the evolution of surgery of the appendix. The remarkable changes which occur in the peritoneum by the mere opening of the abdomen he saw in his own child, who suffered with an appendicitis, on which he thought a tubercular implantation had occurred from infected milk. Dr. Bevan did a laparotomy, finding such a general miliary tuberculosis of the peritoneum as one rarely saw. Scarcely an inch of the peritoneum was without distinct miliary tubercles. The peritoneum covering the intestines, covering the abdominal wall, covering the mesentery, was alike invaded. There were glandular masses as large as a fist in the mesentery. The entire omentum was caked, yet twelve months later, on opening the abdomen for the relief of the hypertrophied tuberculosis in the ileocæcal region, every trace of the miliary tubercles had disappeared, or was not to be detected. The lymphatic masses had almost disappeared in the mesentery, and the omentum had become more soft and normal-appearing. The opportunity was presented to see the influence of a simple abdominal opening; the total disappearance of the miliary tubercles.

Dr. A. E. Halstead said that he reported a case three years ago at a meeting of the American Medical Association of miliary tuberculosis of the abdomen that he had operated on. A diagnosis of acute appendicitis had been made. A large number of enlarged mesenteric glands were found, so many that it was not thought wise to remove them. Some of these glands were as large as a hen's egg, and the abdominal cavity was studded with tubercles. The patient finally recovered after about three months, and was sent to Colorado. Later, she developed a postoperative hernia. On returning to Chicago at the end of three years, she had apparently recovered from the tuberculosis. He operated on her for the hernia, inspected the abdominal cavity at the time, and was unable to find even a trace of the previous peritoneal tuberculosis, excepting that here and there was a small calcareous body representing a gland. She was absolutely free from all evidence of tuberculosis.

This case, and the one reported by Dr. McArthur, he thought, would indicate that operative treatment, as far as removing the glands is concerned, would not appear to be so essential. It

would seem to him to be an operation of great magnitude to remove all the glands, and if these patients recovered without such an operation by simply opening the abdomen and treating the case as one of tuberculosis, from a hygienic and dietetic point of view, it would seem that operation in these cases might not be really necessary.

DR. HOLMES, in closing the discussion, reiterated his belief that the big gall-bladder had produced in his case in the course of less than a week enormous ascites by pressure upon the portal vein, and he thought that the ascites was a predisposing factor toward the localization of the tuberculosis in the peritoneum, and that the peritoneal tuberculosis was only a part of a general miliary tuberculosis which had showed itself in the lung and in the capsule of the liver and genito-urinary organs. Again, he thought that the miliary tuberculosis was probably stirred up by the cholecystectomy and by the examination which he made at that time, which disclosed no adhesions in the abdominal cavity except over the spleen. It was possible that there was a perisplenitis of tuberculous origin, but he could not say so definitely. The cervical region of this gall-bladder contained a few nodules which he carefully examined microscopically, but did not prove to be tuberculous. The gall-bladder had a few times been discovered as tuberculous, but nearly always in cases of rather general tuberculous infection. (Sergent: Thesis, Paris, 1895.)

In regard to the removal of enlarged tuberculous lymph-glands in the mesentery of the intestines, he expressed himself as being of the same opinion as Dr. Halstead and some of the other speakers, that they should not be removed.

He remembered operating on a woman for obstruction of the bowels on whom Dr. Charles T. Parkes had made a diagnosis of an ovarian tumor many years before. This tumor had miraculously disappeared under Dowieism, which prevailed in that neighborhood at that time. This emergency laparotomy was performed in the patient's house with an assistant, the attending physician and the twin sister of the patient. When the abdominal wall was opened a number of hard, cheesy tuberculous glands presented themselves, which confirmed the diagnosis of tuberculous peritonitis of the dry variety. During an hour's

fruitless search for the obstruction six intestines were opened accidentally and closed again. The patient was in collapse, vomiting fecal matter and almost pulseless, when the wound was tamponaded with iodoform gauze and the abdominal incision, which reached nearly the whole length of the abdomen, closed. The patient was not expected to live, but showed herself in perfect health four or five months later.

He once operated upon a patient with tuberculous peritonitis on the diagnosis of appendicitis and found the peritoneum covered with tubercles and the tubes as large as the thumb. A few months later operating for hernia on the same patient no evidence of the former findings could be discovered.

He had observed the fact that the tuberculous peritoneum could withstand an enormous amount of traumatism with good effect. He had operated upon a little boy with a diagnosis of right hydronephrosis, and had discovered a general tuberculous peritonitis with an effusion into a peritoneal sac simulating an enormously distended right kidney. The abdomen was drained, and the patient did well for a few days. One morning the nurse informed him that the abdomen had broken open, and that the intestines were all in the dressing. This was discovered to be the case. They were carefully washed off and replaced, and the abdominal wound closed again. The patient made a prompt and perfect recovery.

He believed that tuberculosis confined to the peritoneum was amenable to surgical treatment. When the primary focus in the appendix, the tubes or other mucous membrane could be discovered, it should be removed. He had never attempted this himself, and always drained as little as possible through a small incision in order to diminish the chance of hernia.

PARTIAL GASTRECTOMY FOR CARCINOMA.

Dr. D. W. Graham exhibited a specimen taken from a man, 60 years of age, who gave a history of gradually failing health for six or nine months previous to operation. There was no obstruction of the pylorus apparently, but there was greatly disturbed nutrition and digestion, stasis, and occasional vomiting. Operation was undertaken, first, as an exploration. A tumor could be felt through the abdominal wall and it was found

to involve the stomach some litttle distance away from the pylorus and implicated the anterior wall largely. There were no adhesions. The tumor was freely movable, and as there were no adhesions he considered it a good case for partial gastrectomy.

There were several interesting features about the tumor itself. There was beginning contraction to make the hour-glass form of the stomach. This contraction involved more particularly the lesser curvature. The tumor had toadstool-like or cauliflower-like projections on the inner wall of the stomach. There was apparently normal mucous membrane between the various toadstool-like projections. The glands along the lesser curvature were felt to be enlarged, as well as along the greater curvature.

The patient died on the fourth day after operation, from peritonitis. He thought leakage had taken place along the line of suture of the stump. The stomach was amputated at the pylorus, then a little more of the pylorus was removed, and the pylorus sutured in the usual way. A posterior gastroenterostomy was made. It was rather difficult to get the line of junction right. He used clamps after Moynihan's method of procedure, and thought in so doing he disturbed the suture line, and that leakage followed the operation. However, when the tumor was removed, water was put in at two points, and the lower point tied, but no leakage was apparent. Nevertheless, he thought the point of leakage was due to disturbance of the suture line in making the gastroenterostomy and that it had been covered up by the exudate which took place before death.

The glands were all removed up to the root of the œsophagus, but there was an enlarged gland left (as shown in the specimen) which was undoubtedly carcinomatous. The lesson to be drawn was that the surgeon should strip all fatty areolar tissue from the vessels and from the base of the œsophagus in gastrectomy. He thought, if there was any fault in connection with the operation, it was in getting the line of junction of the jejunum too close to the line of suture of the stomach.

CORRESPONDENCE.

BENNETT'S FRACTURE OF THE METACARPAL BONES.

EDITOR ANNALS OF SURGERY:

IN my article on "Fractures of the Metacarpal Bones" in the February issue of the ANNALS my correction of the proof, in regard to the frequency of Bennett's fracture, was overlooked or failed to reach you. Since my attention was first called to this injury I have been on the lookout for it. Within the past year I have seen seven cases. I now regard it as the most important fracture of the metacarpal bones and the one most frequently overlooked.

RAYMOND RUSS.

SAN FRANCISCO, March 8, 1906.

CONNELL'S STITCH.

EDITOR ANNALS OF SURGERY:

THE foot-note on page 198 of Dudley Tait's article in the February ANNALS, prompts me to ask that you publish the following quotation, taken from my remarks on page 93, "Transactions, Mississippi Valley Medical Association, Vol. IV.":

"This method is merely a modification of that of M. E. Connell. That method did not meet with general adoption because of the penetration of all coats of the bowel-wall. It was in an effort to remove this objection to, and to improve upon, the older method, that I succeeded in placing the knot within the lumen upon the mucosa. This is practically the only difference between the method of M. E. Connell and the continuous suture that I have described."

F. GREGORY CONNELL.

SALIDA, COL., March 11, 1906.

BOOK REVIEWS.

A Text-Book of Practical Therapeutics; With Especial Reference to the Application of Remedial Measures to Disease and their Employment upon a Rational Basis. By Hobart Amory Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. New (10th) edition. Lea Brothers & Co., Philadelphia and New York. 1904.

Materia Medica and Therapeutics as taught in most of our medical schools to-day leaves the student with only a hazy idea of a collection of drugs which have certain definite effects upon the various functions and tissues of the body. The drugs are memorized and their dosage learned, but their practical application in disease is seemingly a secondary consideration in the eyes of those who are teaching the subject, so that when a man starts in his actual work he rarely knows how and what to prescribe in the cases which come to him for treatment. Even hospital training is deficient in this regard. In most institutions the drugs are put up in favorite combinations known for example as the "D. T. Mixture," "Pneumonia Cough Mixture," etc., and the interne gives a certain dose of one of these mixtures without really knowing the constituent parts of it.

In private practice then the young physician is confronted with the problem of "What shall I give, and how shall I give it?"

The present volume is designed to answer these questions, and does so in a way which makes it valuable to its possessor as a reliable and well-organized book of reference.

The arrangement of the text is admirable, and its double index, the one of Drugs and Remedial Measures, the second of Diseases and Remedies, greatly enhances the value of the book.

The book is in its tenth edition, much enlarged, thoroughly revised and largely re-written.

Paul M. Pilcher.